Air Resources Board

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MEMORANDUM

TO: John Sanders, Chief
Environmental Monitoring and Pest
Management Branch
Department of Pesticide Regulation

FROM: George Lew, Chief
Engineering and Certification Branch
Monitoring and Laboratory Division

DATE: July 26, 2000

SUBJECT: FINAL REPORT FOR THE 1999 AMITRAZ AIR MONITORING

Attached is the final "Report for the Application (Fresno County) and Ambient (Fresno/Kings Counties) Air Monitoring for Amitraz." The separate volume of appendices for the report has been forwarded to Randy Segawa and Pam Wales of your staff and is available upon request. We appreciate your May 24, 2000 comment memo on the draft report and have made the corrections and changes you recommended.

If you or your staff have questions or need further information, please contact me at 327-0900 or Kevin Mongar at 323-1169.

Attachment/Separate Appendices

cc: Ray Menebroker, SSD
Randy Segawa, DPR (w/Attachment/Appendices)
Sharon Seidel, DHS (w/Attachment)
George Alexeeff, Ph.D, OEHHA (w/Attachment)
Jerry Prieto, Fresno County Agricultural Commissioner (w/Attachment)
Dennis Bray, Kings County Agricultural Commissioner (w/Attachment)
David L. Crow, SJVUAPCD (w/Attachment)

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

Report for the Application (Fresno County) and Ambient (Fresno/Kings Counties) Air Monitoring for Amitraz

Testing Section
Engineering and Laboratory Branch
Monitoring and Laboratory Division

Project No. C98-007 (Application)
C98-008 (Ambient)

Date: July 17, 2000

Approved:

Kevin Mongar, Project Engineer

Cynthia L. Castronovo, Acting Manager
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George Lew, Chief
Engineering and Laboratory Branch

Summary

Report for the Application (Fresno County)
and Ambient (Fresno/Kings Counties)
Air Monitoring for Amitraz

This report presents the results of application and ambient air monitoring for amitraz. Application monitoring was conducted in Fresno County around the use of amitraz as an insecticide on 56 acres of cotton from August 6 to August 8, 1999. Ambient monitoring was conducted to coincide with the use of amitraz on cotton in northern Kings and Fresno Counties from July 19 to August 27, 1999. Tables 4 and 5 present the results of application and ambient air monitoring for amitraz, respectively. A summary of the ambient results is presented as Table 6. Laboratory results, in units of ng/sample, equal to or above the estimated quantitation limit (EQL) of 81 ng/sample are reported to 3 significant figures. Results equal to or above the method detection limit (MDL) of 16 ng/sample but below the EQL are reported as detected (Det). Air concentration results (in units of ng/m^3 and pptv) are reported to 2 significant figures. The air concentration, expressed in units of ng/m^3 (or pptv), associated with the EQL is dependent on the volume of air sampled which varies from sample to sample. For a 24-hour sampling period at 30 Lpm the air concentration would be 1.9 ng/m^3 (0.16 pptv) for amitraz as associated with the EQL.

None of the four application background samples had results above the MDL for amitraz. Of the nineteen application samples collected (spikes, blanks, collocated and background samples excluded) one was found to be above the EQL for amitraz, one sample result was "detected" and the remaining seventeen sample results were <MDL. The highest amitraz concentration, 70 ng/m^3 (5.8 pptv), was observed at the east sampling site during the 1st sampling period (application). Normally, low volume (e.g., 3 Lpm) DC/battery vacuum pumps are used for the application tests due to the unavailability of AC power at the field sites. However, a sample flow rate of 30 Lpm was necessary in order to achieve the target EQL for amitraz, and so larger AC vacuum pumps were used for this application test. Generators were used to provide power for these AC pumps. Several of the generators broke down during the test and as a result a number of samples were lost or not collected. The primary downwind sites were operational through the end of the test.

Of the 124 ambient samples collected (spikes, blanks and collocated samples excluded), none were found to be above the EQL for amitraz, two were found to have results of "detected" and the remaining 122 were below the MDL. The "detected" amitraz results were both observed at the Westside Elementary School sampling-site in Five Points. The east sampling position for the application test was located behind the Helm Elementary School and had access to AC power. This sampling site was not initially part of the ambient study but was added to the ambient sampling route after the application test ended (i.e., starting week 4 of the ambient study).

Acknowledgments

Staff of the ARB Testing Section collected the application samples and staff of the ARB Air Quality Surveillance Branch collected the ambient samples. Assistance was provided by the Fresno County Agricultural Commissioner's Office and the Kings County Agricultural Commissioner's Office. Method development and chemical analyses were performed by Terry Houston of the Evaluation Section Laboratory. Neil Adler of the Testing Section prepared the figures presented in this report.

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Report for the Application (Fresno County)
and Ambient (Fresno/Kings Counties)
Air Monitoring for Amitraz

I. Introduction

At the request of the California Department of Pesticide Regulation (DPR) (August 1, 1997 memorandum, Sanders to Lew), the Air Resources Board (ARB) staff determined airborne concentrations of the pesticide amitraz. Application monitoring was conducted in Fresno County around the use of amitraz as an insecticide on 56 acres of cotton from August 6 to August 8, 1999. Ambient monitoring was conducted to coincide with the use of amitraz on cotton in northern Kings and Fresno Counties from July 19 to August 27, 1999. This monitoring was done to fulfill the requirements of AB 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5) which requires the ARB "to document the level of airborne emissions .... of pesticides which may be determined to pose a present or potential hazard..." when requested by the DPR. Method development and sample analyses were conducted by the ARB Evaluation Section Laboratory. Sample collection for the ambient study was conducted by staff of the Air Quality Surveillance Branch and sample collection for the application study was conducted by Testing Section staff.

The protocol for the application and ambient air monitoring of amitraz is enclosed separately as Appendix I (page 1 of a separate volume of appendices to this report).

The laboratory "Report on Amitraz Method Development and Amitraz Analytical Results for Ambient Monitoring and Application Samples", is enclosed separately as Appendix II (page 38 of the separate volume of appendices to this report). The sampling/analysis Standard Operating Procedures (SOP) are also enclosed in Appendix II (page 57 of the separate volume of appendices to this report).

The pesticide use recommendation and report for the application study are enclosed separately as Appendix III (page 63 of the separate volume of appendices to this report).

The DPR's August 1, 1997 memorandum, "Use Information and Air Monitoring Recommendation for the Pesticide Active Ingredient Amitraz" is enclosed separately as Appendix IV (page 65 of the separate volume of appendices to this report).

The application and ambient field log sheets are enclosed separately as Appendix V (page 79 of the separate volume of appendices to this report).

The application meteorological monitoring results are enclosed separately as Appendix VI (page 95 of the separate volume of appendices to this report).

II. Chemical Properties of Amitraz

The following information regarding the chemical properties of amitraz was obtained from the DPR's August 1, 1997 memorandum, "Use Information and Air Monitoring Recommendation for the Pesticidal Active Ingredient Amitraz" (page 65 of appendices).

Amitraz (CAS:33089-61-1) exists as colorless, odorless monoclinic needles. It has a molecular formula of $C_{19}H_{23}N_3$ and a molecular weight of 293.4 g/mole. Amitraz has a water solubility of about 1 mg/L at room temperature. It has a vapor pressure of 0.051 mPa at 20°C and a Henry's Constant of 1.48 x 10^{-7} atm·m^3/mol at 20-25°C. Amitraz is soluble in most organic solvents; it's solubility > 300 g/L in acetone, toluene and xylene.

Amitraz is stable to heat. The reported half-life in buffered aqueous solution (pH 7) is about 6 hours at 20°C. Ultraviolet light appears to have little effect on stability. In soil, amitraz decomposes rapidly under aerobic conditions; it's half-life in soil < 1 day. Degradation occurs more rapidly in acid than in neutral or alkaline soils.

Amitraz's acute oral LD_{50} is 800 mg/kg for rats, and > 1600 mg/kg for mice. Its acute inhalation LC_{50} (6 hours) for rats is 65 mg/L air. Amitraz's LC_{50} (96 hour) is 2.7-4.0 mg/L for rainbow trout and 1.3 mg/L for bluegill sunfish. It exhibits a low toxicity to bees and other predatory insects. Amitraz entered the risk assessment process at DPR under the SB 950 (Birth Defect Prevention Act of 1984) based on potential oncogenic, reproductive and mutagenicity effects.

III. Sampling

A sketch of the sampling apparatus is shown in Figure 4. Samples were collected by passing a measured volume of ambient air through XAD-2 resin. The resin holders are 4-3/4" long x 1-55/66" O.D. and made of Teflon. Each holder contained approximately 30cc of specially prepared XAD-2 resin (Supelpak-2B). The resin was held in place by stainless steel screens between Teflon support rings. Rotameters were used to control sample flow rates. The rotameters were adjusted to the correct flow (30 Lpm) before each 24-hour sampling period and checked at the end of each sampling period using a calibrated digital mass flow meter. The sampling system operated continuously with the exact operating interval noted. Samplers were leak checked prior to each sampling period with the sampling cartridges installed. Any change in the flow rates was recorded in the field log book (see appendices pg. 79). The resin tubes were protected from direct sunlight, with aluminum foil, and supported about 1.5 meters above the ground (or roof) during the sampling period. At the end of each sampling period the holders were capped and placed in a zip-lock plastic bag with an identification label affixed. The field log book was used to record start and stop times, sample identifications, start and stop flow rates and any other significant comments. Subsequent to sampling, the samples were shipped or transported on dry ice, as soon as reasonably possible, to the Evaluation Section Laboratory in Sacramento. The samples were then stored in the freezer until extraction and analysis.

A. Application Monitoring

The DPR's monitoring recommendation suggested that "...application-site air monitoring should be conducted from mid-May through June in Yuba County in association with pre-harvest application to pears" at an application rate of 1.5 A.I. lbs./acre. However, use of amitraz on pears had decreased drastically in California by 1999 (very little or no use expected) and so the application test was conducted in Fresno County (during the ambient monitoring study) at a lower application rate (0.375 A.I. lbs./acre).

A 56 acre cotton field was chosen for the application monitoring site. Refer to Figure 2 for a diagram of the application site. Approximately 150 acres of cotton to the north and northeast of the 56 acre plot was treated with amitraz at the same time and at the same application rate.

Refer to Appendix III (page 63 of appendices) for a copy of the pesticide use recommendation and report.

Information collected regarding the application included: 1) the elevation of each sampling station with respect to the field, 2) the orientation of the field with respect to North (identified as either geographic or magnetic), 3) an accurate record of the positions of the monitoring equipment with respect to the field, including the distance each monitor is positioned away from the edge of the field and an accurate drawing of the monitoring site showing the precise location of the monitoring equipment and any wind obstacles with respect to the field, 4) the field size, 5) the application rate, 6) formulation and 7) method and length of application. Details regarding the site and application are summarized below in Table 1.

Table 1.
Application Information

Range/Township/Section:	R:17/T:16/S:15
Product Applied:	Ovasyn
Type of Application:	Aerial by helicopter
Application Rate:	2 pints product per acre (0.375 lbs. amitraz A.I. per acre)
Applicator:	Helm Fertilizer, Inc.

A three day monitoring period was recommended in the DPR's August 1, 1997 memorandum with intended sampling times as follows: (where the first sample is started at the start of application) application + 1 hour, followed by one 2-hour sample, one 4-hour sample, two 8-hour samples and two 24-hour samples. However, DPR recently directed that this sample schedule be modified as follows: during application, followed by a 1-hour sample, a 2-hour sample, a 3-hour sample (or up to 1 hour before sunset), a 6-hour sample (or up to 1 hour before sunset), overnight (until 1 hour after sunrise), daytime (until 1 hour before sunset), overnight (until 1 hour after sunrise) and 24 hour (until 1 hour after sunrise).

Background samples were taken at each position to establish if any amitraz was detectable in the air before the application (i.e., from nearby applications). The background samples were collected from 1430 to 2300 on August 6, 1999 (8.5 hours). Normally we would attempt to collect the background sample for a minimum of 12 hours but preferably for 24 hours. This was not possible on this test due to the very short time between owner approval for the test and the application. The application started at 0000 and ended at 0030 on August 7, 1999 (samples were started at 2300 due to uncertainty of the exact arrival time of the helicopter). The aerial application was conducted by helicopter and started in the southwest corner, proceeding in east/west passes. Table 2 lists the approximate sampling periods.

Table 2.
Application Sampling Periods

Period		Date	Approx. Time
Background	8.5 hours	8/6/99	1430 to 2300
1	Application (1.75 hours)	8/6-7/99	2300 to 0045
2	7.25 hours (overnight)	8/7/99	0045 to 0800
3	13.75 hours (daytime)	8/7/99	0800 to 1945
4	12 hours (overnight)	8/7-8/99	1945 to 0745
5	24 hours	8/8-9/99	0745 to 0745

Four samplers were positioned, one on each side of the field. A fifth sampler was collocated at the east position. The west, north, east and south samplers were positioned approximately 33 feet, 38 feet, 65 feet and 97 feet from the field respectively. All samplers were at the same elevation above the field (1.5 meters) except the west sampler which was 3 feet higher. The west, north and east samplers were centered (approximately) on the field side. The south sampler was placed closer to the west side of the field to avoid disturbing the nearby residences with the generator noise.

The meteorological station (oriented toward geographic north) was positioned on the east side of the field about 40 feet north of the "east" samplers. The meteorological station was set up to determine wind speed and direction, air temperature, barometric pressure and relative humidity. The raw meteorological station data is available on a 1.44 MB diskette (comma delimited format). Appendix VI (page 95 of the appendices) lists the meteorological station data in 15 minute averages for the test period. ARB staff noted the degree of cloud cover, on the sample log sheet, whenever sample cartridges were changed. The sky conditions varied from clear to partly cloudy to overcast during the study period.

B. Ambient Monitoring

Ambient monitoring took place during a six week period from July 19 to August 27, 1999. Four sampling sites were selected by ARB personnel from the areas of Fresno and Kings Counties where cotton farming is predominant and in populated areas or in areas frequented by people. Sites were selected with considerations for both accessibility and security of the sampling equipment. Background samples were collected at the ARB ambient air monitoring station in downtown Fresno. The east sampling position for the *application* test was located behind the Helm Elementary School and had access to AC power. This sampling site was not initially part of the ambient study but was added to the ambient sampling route after the application test ended (i.e., starting week 4 of the ambient study). The six sites are presented in Figure 1 and listed in Table 3. Twenty-four hour (approximately) samples were taken Monday through Friday (4 samples/week) at a flow rate of 30 Lpm. A total of 124 samples (plus 34 collocated samples and 12 quality assurance spikes) were collected.

Table 3.
Ambient Sampling Sites

HEL	Helm Elementary School 13883 S. Lassen Avenue Helm, CA 93627 Range/Township/Section: R.17E/T.16S/S.15-SE1/4 of SE1/4	(559) 693-1115 Dr. Vaughn Superintendent
WES	Westside Elementary School 19191 Excelsior Ave. Five Points, CA 93624 Range/Township/Section: R.17E/T.17S/S.22-SE1/4 of SE 1/4	(559) 884-2492 Baldo Hernandez Superintendent
HUR	Huron Elementary School 36131 N Street Huron, CA 93234 Range/Township/Section: R.17E/T.20S/S.11-NW1/4	(559) 935-7500 Pat Lewis Superintendent

SES	Stratford Elementary School 19348 Empire St. Stratford, CA 93266 Range/Township/Section: R.20E/T.20S/S.17 NE1/4	(559) 947-3391 Joan Gusinow Superintendent
LHS	Lemoore High School 101 East Bush Lemoore, CA 93245 Range/Township/Section: R.20E/T.19S/S.11-NW1/4	(559) 924-6610 Michael Cawley Superintendent
ARB	ARB Air Monitoring Station 3425 N First, Suite 205B Fresno, CA 93726-6819 Range/Township/Section: R.20E/T.11S/S.22-SE1/4 of SE1/4	(559) 228-1825 Dave Wilkerson

The Helm Elementary School is in the small town of Helm. There were cotton fields directly to the west (20 yards) and approximately 200 yards to the north. The sampling unit was placed on the ground behind the school. The sampling cartridges were positioned approximately 4 feet above the ground. This site was not originally part of the ambient monitoring study. The east sampling position for the *application* test was located behind the Helm Elementary School and had access to AC power. This site was added to the ambient sampling route after the application test ended (i.e., starting week 4 of the ambient study).

The Westside Elementary School is in the sparsely populated area of Five Points. The school is surrounded by agriculture with cotton approximately 50 yards to the south and several hundred yards to the east and northwest. The sampling unit was placed on a small storage container at a height of approximately 7 feet. The sampling cartridges were positioned approximately 4 feet above the top of the container. Thus, air was sampled through the cartridges at a height of approximately 11 feet.

The Huron Elementary School is located in a residential area in the small town of Huron. There were cotton fields at a distance of approximately 1 mile to the south and northwest. The sampling unit was placed on the top of a single story building at a height of approximately 16 feet. The sampling cartridges were positioned approximately 4 feet above the roof. Thus, air was sampled through the cartridges at a height of approximately 20 feet.

The Stratford Elementary School is located in the small town of Stratford. There were cotton fields to the east at a distance of approximately 100 yards and to the south and west at a distance of approximately ½ mile. The sampling unit was placed on the roof of the school gymnasium at a height of approximately 35 feet. The sampling cartridges were positioned approximately 4 feet above the roof. Thus, air was sampled through the cartridges at a height of approximately 39 feet.

The Lemoore High School is in a residential area in the town of Lemoore. There were cotton fields to the north and west at a distance of approximately 3 miles. The sampling unit was placed on the top of a single story building at a height of approximately 14 feet. The sampling cartridges were positioned approximately 4 feet above the roof. Thus, air was sampled through the cartridges at a height of approximately 18 feet.

The background monitoring was conducted at the ARB air monitoring site in a

residential/business area in downtown Fresno. The sampler was placed on a second-story roof near other monitoring equipment at a height of approximately 30 feet. The sampling cartridges were positioned approximately 4 feet above the roof. Thus, air was sampled through the cartridges at a height of approximately 34 feet.

IV. Analytical Methodology

The "Standard Operating Procedures for Sampling and Analysis of Amitraz in Ambient Air" are enclosed as Appendix II (page 57 of appendices). The procedures specify that the exposed XAD-2 resin tubes are stored in an ice chest on dry ice or in a freezer until desorbed with 100 mL of ethyl acetate. The extract is evaporated to dryness with nitrogen and then dissolved in 1 mL of n-hexane containing 500 ng of atrazine $^{13}C_3$. The splitless injection volume is 1 uL. A gas chromatograph with a DB-5MS capillary column and a quadrapole mass spectrometer (MS) is used for analysis. The MS detector is operated in selected ion monitoring mode.

V. Application and Ambient Results

Tables 4 and 5 present the results of application and ambient air monitoring, respectively, for amitraz. A summary of the ambient results is presented in Table 6.

The Evaluation Section Laboratory determined the analytical MDL as (3.14)(s); where s is the standard deviation calculated for the results of seven replicate resin spikes (near the estimated detection limit). The MDL was 16.2 ng/sample for amitraz. The estimated quantitation limit (EQL), calculated as 5 times the MDL, was 81.2 ng/sample for amitraz. Results equal to or above the MDL but below the EQL are reported as detected (Det). Laboratory results, in units of ng/sample, equal to or above the EQL are reported to 3 significant figures. Air concentration results (in units of ng/m^3 and pptv) are reported to 2 significant figures. The air concentration, expressed in units of ng/m^3 (or pptv), associated with the EQL is dependent on the volume of air sampled which varies from sample to sample. For a 24-hour sampling period at 30 Lpm the air concentration would be 1.9 ng/m^3 (0.16 pptv) as associated with the EQL for amitraz.

The equation used to convert amitraz air concentration from units of ng/m^3 to pptv units at 1 atmosphere and 25 °C is shown below.

$$\text{pptv} = (\text{ng/m}^3) \times \frac{(0.0820575 \text{ liter-atm/mole-°K})(298\text{°K})}{(1 \text{ atm})(293.4 \text{ gram/mole})} = (0.0833) \times (\text{ng/m}^3)$$

A. Application Monitoring Results

The application sample results have also been summarized as associated with sampling period wind roses in Figure 3. The spokes of the wind roses correspond to the compass direction of origin of the wind. For example, the slight breezes were predominantly from the north/northwest during the first sampling period (period 1). The segments of each spoke correspond to incremental increases in wind speed of 2 mph each. The length of the spoke (and each segment) corresponds to the portion of the sampling time that the wind was from that direction (at that velocity).

None of the four application background samples had results above the MDL for amitraz. Of the

nineteen application samples collected (spikes, blanks, collocated and background samples excluded) one was found to be above the EQL for amitraz, one sample result was "detected" and the remaining seventeen sample results were <MDL. The highest amitraz concentration, 70 ng/m^3 (5.8 pptv), was observed at the east sampling site during the 1st sampling period (application). Normally, low volume (e.g., 3 Lpm) DC/battery vacuum pumps are used for the application tests due to the unavailability of AC power at the field sites. However, a sample flow rate of 30 Lpm was necessary in order to achieve the target EQL for amitraz, and so larger AC vacuum pumps were used for this application test. Generators were used to provide power for these AC pumps. Several of the generators broke down during the test and as a result a number of samples were lost or not collected. The primary downwind sites were operational though the end of the test.

B. Ambient Monitoring Results

Of the 124 ambient samples collected (spikes, blanks and collocated samples excluded), none were found to be above the EQL for amitraz, two were found to have results of "detected" and the remaining 122 were below the MDL. The "detected" amitraz results were both observed at the Westside Elementary School sampling-site in Five Points. The east sampling position for the *application* test was located behind the Helm Elementary School and had access to AC power. This sampling site was not initially part of the ambient study but was added to the ambient sampling route after the application test ended (i.e., starting week 4 of the ambient study).

VI. Quality Assurance

Field quality control (QC) for the application monitoring included the following:

1) Four field spikes (same environmental and experimental conditions as those occurring at the time of ambient sampling) prepared by the Evaluation Section staff. The field spikes were obtained by sampling ambient air at 30 Lpm for the same duration as the background samples (i.e., collocated with a background sample);
2) four trip spikes;
3) replicate samples (collocated) collected at one of the four sampling sites;
4) a trip blank; and
5) background samples at each side of the field.

Field QC for the ambient monitoring included the following:

1) Two field spikes (same environmental and experimental conditions as those occurring at the time of ambient sampling) prepared by the Evaluation Section staff; the field spikes were obtained by sampling ambient air at the background monitoring site for 24 hour periods at 30 Lpm (collocated with an ambient sample). Originally 4 spiked cartridges were intended to be used as field spikes but the field crew did not pull ambient air through 2 of these cartridges. Thus, 2 of the 4 were field spikes and 2 were designated as additional trip spikes;
2) six trip spikes;
3) replicate (collocated) samples taken for six dates at each sampling location; and
4) 3 trip blanks; There was supposed to be a trip blank collected once per week for the six week study. The field technician forgot to submit these samples to the lab for

three of the weeks.

Rotameters were used to control the sampling flow rate. The flow rates were set at the start of every sampling period (every sample) using a calibrated digital mass flow meter. The flow rates were also checked and recorded at the end of each sampling period using the mass flow meter. The mass flow meter was calibrated by the ARB Standards Laboratory.

The instrument dependent parameters (reproducibility, linearity and EQL) are discussed in the SOP (page 57 of the appendices). A chain of custody sheet accompanied all samples.

VII. Quality Assurance Results

A. Method Development

Refer to Appendix II (page 56 of the appendices), "Standard Operating Procedure for the Sampling and Analysis of Amitraz", for discussion and results of method development studies. The freezer storage stability study results (pg. 41 of appendices) show that amitraz is stable for at least 14 weeks. All of the ambient and application samples were analyzed within 9 weeks.

B. Trip Blanks

The application trip blank and the 3 ambient trip blanks had results of <MDL for amitraz.

C. Application Background Sample Results

All four of the application background samples had results below the MDL for amitraz.

D. Collocated Sample Results

One collocated pair of samples for the application study had results above the EQL. The relative difference (100 x difference/average) of the data pair is 59%.

None of the ambient collocated pairs had both results above the EQL and so no comparison can be made.

E. Laboratory Spikes

Laboratory spikes are prepared at the same time and at the same level as the trip spike and field spike sets. The laboratory spikes are kept in a freezer until extraction and analysis. The extraction and analysis of laboratory, trip and field spikes normally occurs at the same time. Laboratory spikes for the ambient study were prepared by Evaluation Section staff (no lab spike set was generated for the application study).

The laboratory spike results for the ambient study are listed in Table 9. Each of the spike cartridges was spiked with 200 ng of amitraz. The average recovery for amitraz for the ambient lab spikes was 99%.

F. Trip Spikes

Trip spikes are prepared at the same time and at the same level as the laboratory spike and field spike sets. The trip spikes are kept in a freezer until transported to the field. The trip spike samples are kept on dry ice in an ice chest (the same one used for samples) during transport to and from the field and at all times while in the field except for trip spike sample log-in and labeling. Trip spikes for the application and ambient studies were prepared by Evaluation Section staff.

The trip spike results for the application and ambient studies are listed in Tables 7 and 10 respectively. Each of the cartridges was spiked with 200 ng of amitraz. The average recoveries for amitraz for the application trip spikes was 82% and for the ambient trip spikes was 94%. These results are consistent with the lab spike results and indicate that the sample transport, storage and analytical procedures used in this study produce acceptable results for amitraz.

G. Field Spikes

Field spikes are prepared at the same time and at the same level as the laboratory spike and trip spike sets. The field spikes are kept in a freezer until transported to the field. The field spike samples are kept on dry ice in an ice chest (the same one used for samples) during transport to and from the field and at all times while in the field except for the sampling period. Field spikes were collected at the same environmental and experimental conditions as those occurring at the time of ambient sampling. The field spikes were obtained by sampling ambient air through a previously spiked cartridge. (i.e., collocated with an ambient or background sample). Field spike sets for the application and ambient studies were prepared by Evaluation Section staff.

The field spike results for the application and ambient studies are listed in Tables 8 and 11 respectively. Each of the cartridges was spiked with 200 ng of amitraz. The average recovery for amitraz for the application field spikes was 129%. One of the two ambient field spikes was invalidated (broken) during processing and the recovery of the other was 121%. These results are slightly higher than the trip spike results (by approximately 60 to 80 ng/sample). The reason for the higher results is not readily apparent as the collocated background samples (application and ambient) had results less than the MDL of 16 ng/sample. However, as these differences are minor and the levels are near the quantitation limit (80 ng/sample), the spike results still indicate that the sampling, sample transport, storage and analytical procedures used in this study produce acceptable results for amitraz.

Figure 1
Amitraz Air Monitoring Area
(From DPR's 1996 use map)

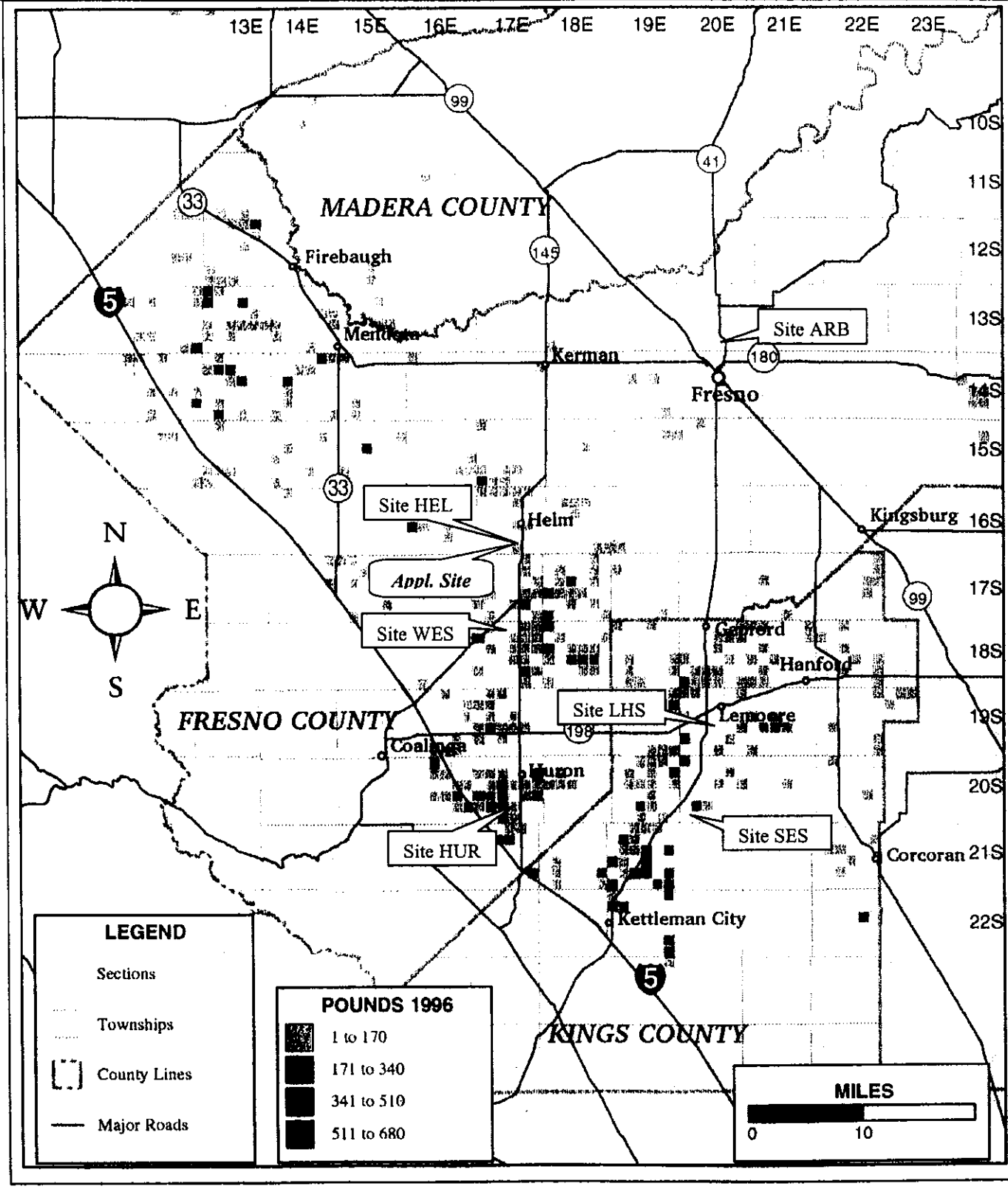
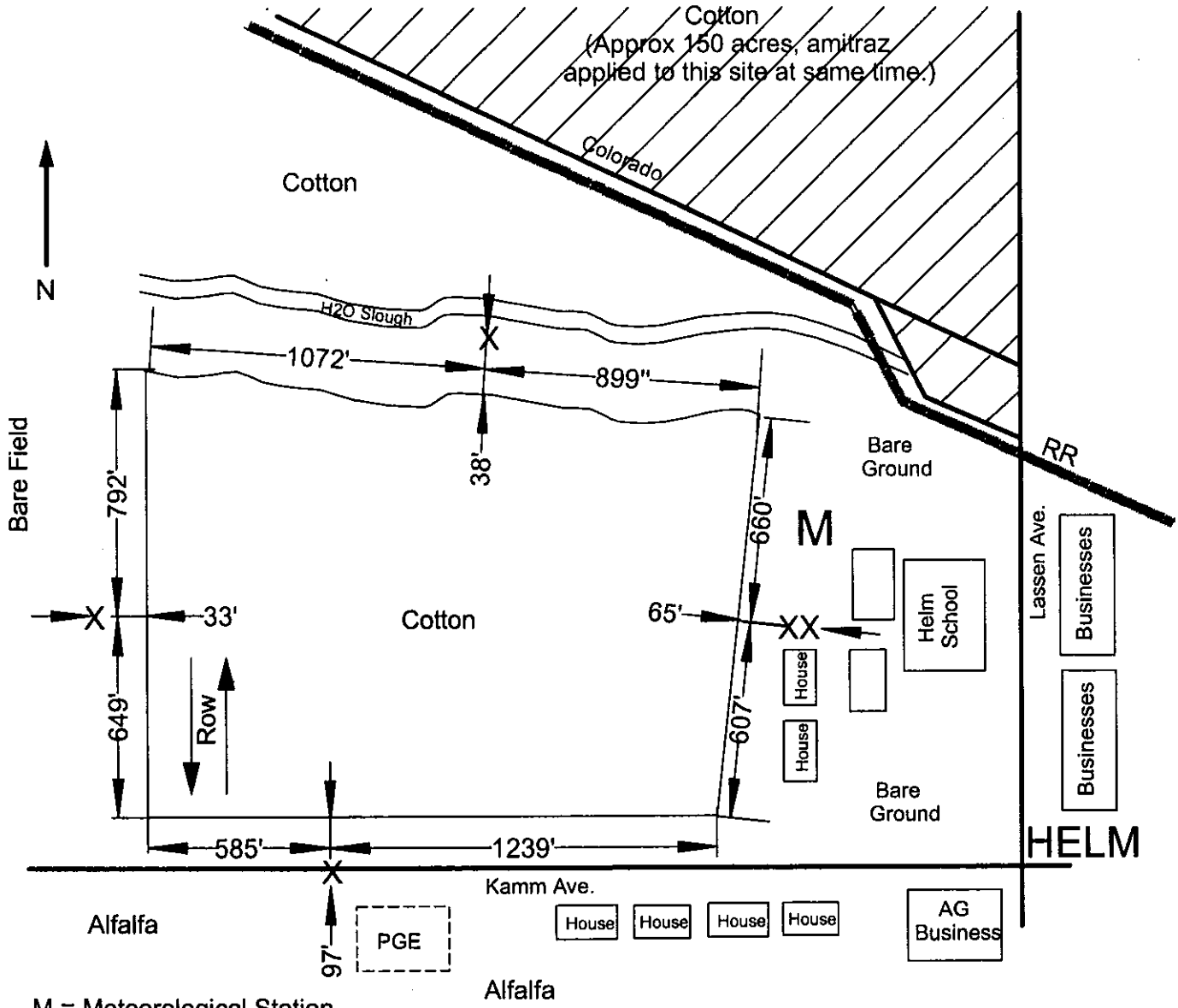


Figure 2
Amitraz Application Site



M = Meteorological Station
N = Geographic North
Distance in feet

Figure 3. Amitraz Application Data (ng/m3)

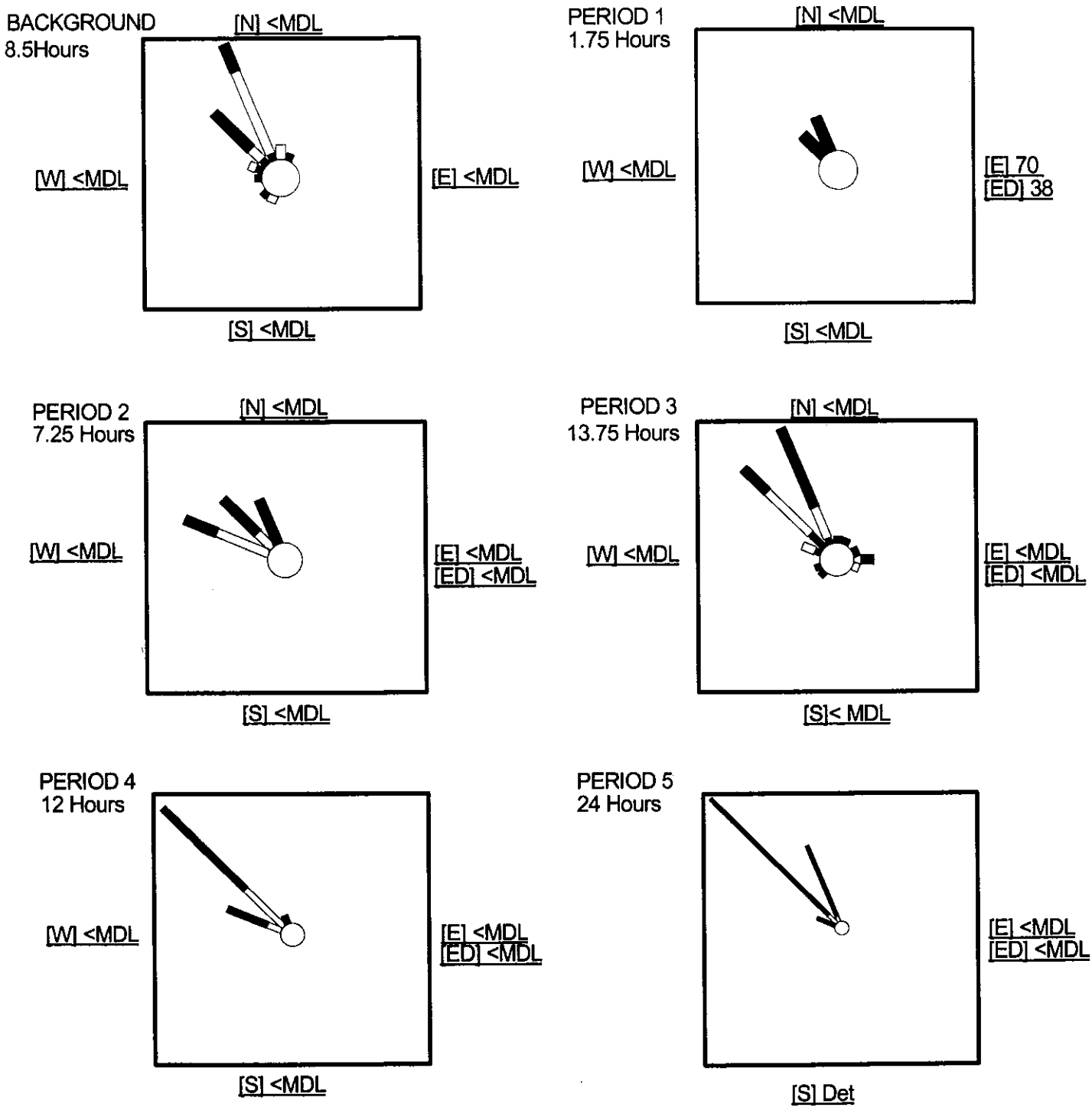


Figure 4
30 LPM SAMPLE TREE

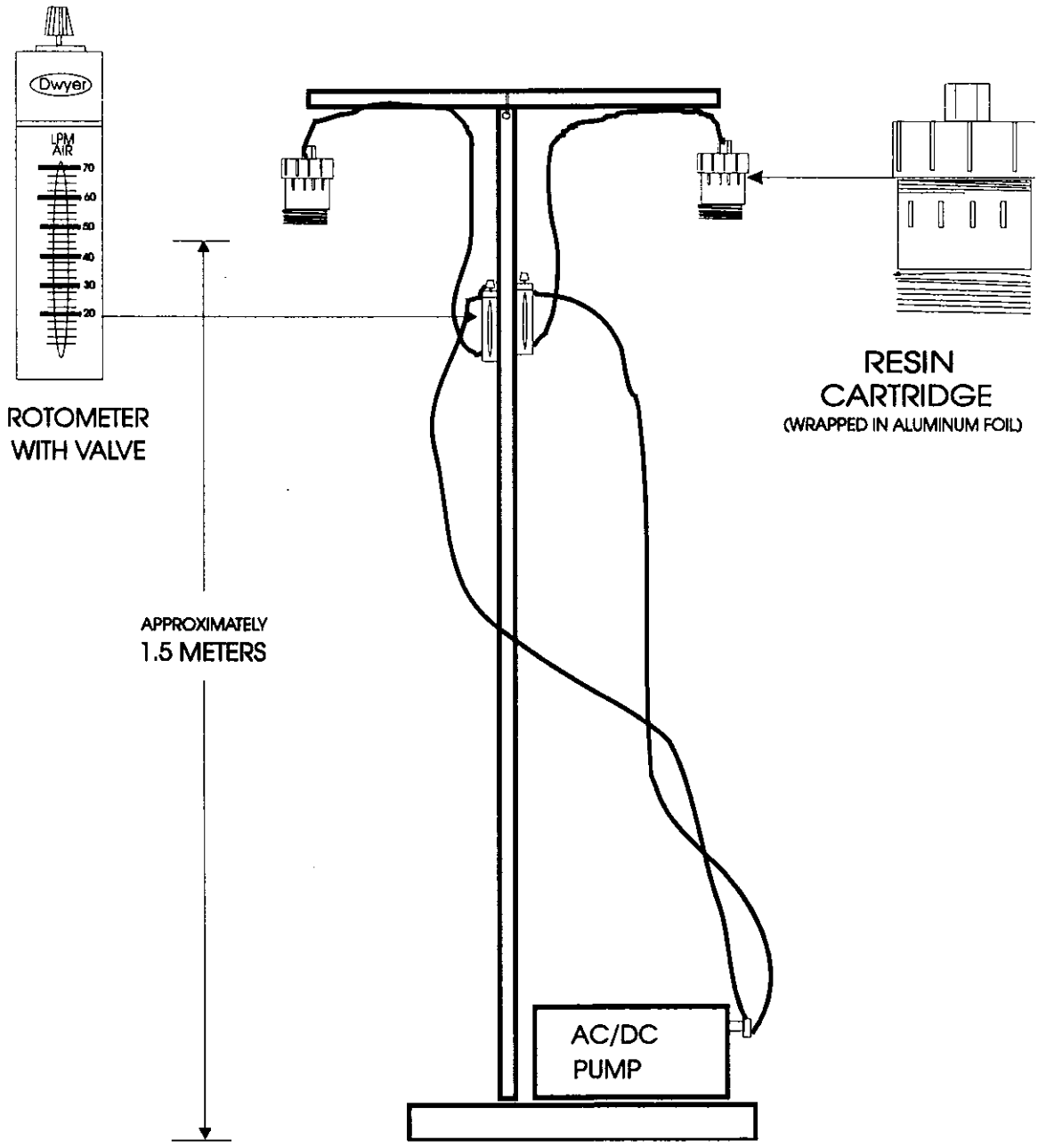


Table 4. Amitraz Application Monitoring Results

Log #	Sample ID	Start Date/Time	End Date/Time	Time (min)	Time (hours)	Volume (m3)	Amitraz Sample Results			Data Flags
							(ng/sample)	(ng/m3)	*(pptv)	
1	NB	08/06/99 1430	08/06/99 2300	510	8.5	15.3	<MDL	<MDL	<MDL	
3	WB	08/06/99 1445	08/06/99 2255	490	8.2	14.7	<MDL	<MDL	<MDL	
5	SB	08/06/99 1455	08/06/99 2310	495	8.3	14.9	<MDL	<MDL	<MDL	
7	EB	08/06/99 1510	08/06/99 2245	455	7.6	13.6	<MDL	<MDL	<MDL	
9	E1	08/06/99 2245	08/07/99 0035	110	1.8	3.3	2.31E+2	7.0E+01	5.8E+00	
10	E1D	08/06/99 2245	08/07/99 0035	110	1.8	3.3	1.25E+2	3.8E+01	3.2E+00	
11	S1	08/06/99 2310	08/07/99 0045	95	1.6	2.8	<MDL	<MDL	<MDL	
12	W1	08/06/99 2255	08/07/99 0050	115	1.9	3.4	<MDL	<MDL	<MDL	
13	N1	08/06/99 2300	08/07/99 0100	120	2.0	3.6	<MDL	<MDL	<MDL	
14	E2	08/07/99 0035	08/07/99 0745	430	7.2	12.9	<MDL	<MDL	<MDL	
15	E2D	08/07/99 0035	08/07/99 0745	430	7.2	12.9	<MDL	<MDL	<MDL	
16	S2	08/07/99 0045	08/07/99 0750	425	7.1	12.8	<MDL	<MDL	<MDL	
17	W2	08/07/99 0050	08/07/99 0800	430	7.2	12.9	<MDL	<MDL	<MDL	
18	N2	08/07/99 0100	08/07/99 0810	430	7.2	12.9	<MDL	<MDL	<MDL	
19	E3	08/07/99 0745	08/07/99 1930	705	11.8	21.2	<MDL	<MDL	<MDL	
20	E3D	08/07/99 0745	08/07/99 1930	705	11.8	21.2	<MDL	<MDL	<MDL	
21	S3	08/07/99 0750	08/07/99 1945	715	11.9	21.4	<MDL	<MDL	<MDL	
22	W3	08/07/99 0800	08/07/99 1950	710	11.8	21.3	<MDL	<MDL	<MDL	
23	N3	08/07/99 0810	08/07/99 1955	705	11.7	21.1	<MDL	<MDL	<MDL	
24	E4	08/07/99 1930	08/08/99 0730	720	12.0	21.6	<MDL	<MDL	<MDL	2
25	E4D	08/07/99 1930	08/08/99 0730	720	12.0	21.6	<MDL	<MDL	<MDL	2
26	S4	08/07/99 1945	08/08/99 0740	715	11.9	21.5	<MDL	<MDL	<MDL	
27	W4	08/07/99 2020	08/08/99 0750	690	11.5	20.7	<MDL	<MDL	<MDL	
28	N4	08/07/99 1955	NA	NA	NA	NA	NA	NA	NA	1
29	E5	08/08/99 0730	08/09/99 0730	1440	24.0	43.2	<MDL	<MDL	<MDL	
30	E5D	08/08/99 0730	08/09/99 0730	1440	24.0	43.2	<MDL	<MDL	<MDL	2
31	S5	08/08/99 0740	08/09/99 0740	1440	24.0	43.2	Det	Det	Det	2
32	W5	NA	NA	NA	NA	NA	NA	NA	NA	1
33	N5	NA	NA	NA	NA	NA	NA	NA	NA	1
34	TB	08/08/99 0800	NA	NA	NA	NA	<MDL	NA	NA	

MDL = 16 ng/sample
Det = <EQL of 80 ng/sample but ≥MDL
* pptv at 1 atm and 25 C
NA = Not Applicable

1. No sample, generator problem.
2. End flow rates were >10% different from the start rate.

Table 5. Amitraz Ambient Monitoring Results

Log-#	Sample ID	Start Date/Time	End Date/Time	Sample Time (min.)	Sample Time (hours)	Sample Volume (m3)	Amitraz Sample Results			Data Flags
							ng/sample	(ng/m3)	*(pptv)	
1	WES1	7/19/99 10:55	7/20/99 10:55	1440	24.0	43.2	<MDL	<MDL	<MDL	3
2	HUR1	7/19/99 11:36	7/20/99 11:40	1444	24.1	43.3	<MDL	<MDL	<MDL	3
3	SES1	7/19/99 12:11	7/20/99 12:30	1459	24.3	43.8	<MDL	<MDL	<MDL	3
4	LHS1	7/19/99 12:50	7/20/99 13:00	1450	24.2	43.5	<MDL	<MDL	<MDL	3,4
5	ARB1	7/19/99 15:00	7/20/99 15:00	1440	24.0	43.2	<MDL	<MDL	<MDL	3,4
6	WES2	7/20/99 10:55	7/21/99 10:55	1440	24.0	43.2	<MDL	<MDL	<MDL	3
7	HUR2	7/20/99 11:55	7/21/99 11:40	1425	23.7	42.7	<MDL	<MDL	<MDL	3
8	SES2	7/20/99 12:30	7/21/99 12:35	1445	24.1	43.3	<MDL	<MDL	<MDL	3
9	LHS2	7/20/99 13:00	7/21/99 13:05	1445	24.1	43.4	<MDL	<MDL	<MDL	3
10	ARB2	7/20/99 15:10	7/21/99 15:10	1440	24.0	43.2	<MDL	<MDL	<MDL	3
11	WES3	7/21/99 10:55	7/22/99 10:50	1435	23.9	43.1	<MDL	<MDL	<MDL	3
12	WES3D	7/21/99 10:55	7/22/99 10:50	1435	23.9	43.1	<MDL	<MDL	<MDL	3
13	HUR3	7/21/99 11:40	7/22/99 11:40	1440	24.0	43.2	<MDL	<MDL	<MDL	3
14	HUR3D	7/21/99 11:40	7/22/99 11:40	1440	24.0	43.2	<MDL	<MDL	<MDL	3
15	SES3	7/21/99 12:35	7/22/99 12:35	1440	24.0	43.2	<MDL	<MDL	<MDL	3
16	SES3D	7/21/99 12:35	7/22/99 12:35	1440	24.0	43.2	<MDL	<MDL	<MDL	3
17	LHS3	7/21/99 13:05	7/22/99 13:05	1440	24.0	43.2	<MDL	<MDL	<MDL	3
18	LHS3D	7/21/99 13:05	7/22/99 13:05	1440	24.0	43.2	<MDL	<MDL	<MDL	3
19	ARB3	7/21/99 15:10	7/22/99 15:10	1440	24.0	43.2	<MDL	<MDL	<MDL	3
20	ARB3D	7/21/99 15:10	7/22/99 15:10	1440	24.0	43.2	<MDL	<MDL	<MDL	3
21	WES4	7/22/99 10:50	7/23/99 10:50	1440	24.0	43.2	<MDL	<MDL	<MDL	3,4
22	HUR4	7/22/99 11:40	7/23/99 11:40	1440	24.0	43.2	<MDL	<MDL	<MDL	3,4
23	SES4	7/22/99 12:35	7/23/99 12:35	1440	24.0	43.2	<MDL	<MDL	<MDL	3
24	LHS4	7/22/99 13:05	7/23/99 13:05	1440	24.0	43.2	<MDL	<MDL	<MDL	3,4
25	ARB4	7/22/99 15:05	7/23/99 15:05	1440	24.0	43.2	<MDL	<MDL	<MDL	3,4
26	WES5	7/26/99 10:45	7/28/99 10:45	2880	48.0	86.4	<MDL	<MDL	<MDL	1
27	HUR5	7/26/99 11:40	7/28/99 11:40	2880	48.0	86.4	<MDL	<MDL	<MDL	1
28	SES5	7/26/99 12:35	7/28/99 12:35	2880	48.0	86.4	<MDL	<MDL	<MDL	1

MDL = 16 ng/sample
Det = <EQL of 80 ng/sample but ≥MDL
* pptv at 1 atm and 25 C
NA = Not Applicable

1. Sample Duration was > 24 hours.
2. No sample.
3. Samples were not on dry ice on delivery.
4. End flow rates were >10% different from the start rate.

Table 5. Amitraz Ambient Monitoring Results

Log-#	Sample ID	Start Date/Time	End Date/Time	Sample Time (min.)	Sample Time (hours)	Sample Volume (m3)	Amitraz Sample Results			Data Flags
							ng/sample	(ng/m3)	*(pptv)	
29	LHS5	7/26/99 13:05	7/28/99 13:05	2880	48.0	86.4	<MDL	<MDL	<MDL	1
30	ARB5	7/26/99 15:15	7/28/99 15:15	2880	48.0	86.4	<MDL	<MDL	<MDL	1
31	WES6	7/28/99 10:45	7/29/99 10:40	1435	23.9	43.1	<MDL	<MDL	<MDL	
32	WES6D	7/28/99 10:45	7/29/99 10:45	1440	24.0	43.2	<MDL	<MDL	<MDL	
33	HUR6	7/28/99 11:35	7/29/99 11:35	1440	24.0	43.2	<MDL	<MDL	<MDL	
34	HUR6D	7/28/99 11:35	7/29/99 11:35	1440	24.0	43.2	<MDL	<MDL	<MDL	
35	SES6	7/28/99 12:35	7/29/99 12:35	1440	24.0	43.2	<MDL	<MDL	<MDL	
36	SES6D	7/28/99 12:35	7/29/99 12:35	1440	24.0	43.2	<MDL	<MDL	<MDL	
37	LHS6	7/28/99 13:05	7/29/99 13:05	1440	24.0	43.2	<MDL	<MDL	<MDL	
38	LHS6D	7/28/99 13:05	7/29/99 13:05	1440	24.0	43.2	<MDL	<MDL	<MDL	
39	ARB6	7/28/99 15:20	7/29/99 15:20	1440	24.0	43.2	<MDL	<MDL	<MDL	
40	ARB6D	7/28/99 15:20	7/29/99 15:20	1440	24.0	43.2	<MDL	<MDL	<MDL	
41	WES7	7/29/99 10:40	7/30/99 10:40	1440	24.0	43.2	<MDL	<MDL	<MDL	4
42	HUR7	7/29/99 11:35	7/30/99 11:35	1440	24.0	43.2	<MDL	<MDL	<MDL	4
43	SES7	7/29/99 12:35	7/30/99 12:35	1440	24.0	43.2	<MDL	<MDL	<MDL	4
44	LHS7	7/29/99 13:05	7/30/99 13:05	1440	24.0	43.2	<MDL	<MDL	<MDL	4
45	ARB7	7/29/99 15:20	7/30/99 15:25	1445	24.1	43.3	<MDL	<MDL	<MDL	4
46	WES8	8/02/99 10:45	8/03/99 10:45	1440	24.0	43.2	<MDL	<MDL	<MDL	
47	HUR8	8/02/99 11:30	8/03/99 11:30	1440	24.0	43.2	<MDL	<MDL	<MDL	
48	SES8	8/02/99 12:35	8/03/99 12:35	1440	24.0	43.2	<MDL	<MDL	<MDL	
49	LHS8	8/02/99 13:05	8/03/99 12:55	1430	23.8	42.9	<MDL	<MDL	<MDL	
50	ARB8	8/02/99 14:10	8/03/99 14:10	1440	24.0	43.2	<MDL	<MDL	<MDL	
51	TB1	8/02/99 11:20	8/02/99 11:20	NA	NA	NA	<MDL	NA	NA	
52	WES9	8/03/99 10:35	8/04/99 10:45	1450	24.2	43.5	<MDL	<MDL	<MDL	
53	HUR9	8/03/99 11:30	8/04/99 11:30	1440	24.0	43.2	<MDL	<MDL	<MDL	
54	SES9	8/03/99 12:35	8/04/99 12:35	1440	24.0	43.2	<MDL	<MDL	<MDL	
55	LHS9	8/03/99 12:55	8/04/99 12:55	1440	24.0	43.2	<MDL	<MDL	<MDL	
56	ARB9	8/03/99 15:10	8/04/99 15:05	1435	23.9	43.0	<MDL	<MDL	<MDL	

MDL = 16 ng/sample
Det = <EQL of 80 ng/sample but ≥MDL
* pptv at 1 atm and 25 C
NA = Not Applicable

1. Sample Duration was > 24 hours.
2. No sample.
3. Samples were not on dry ice on delivery.
4. End flow rates were >10% different from the start rate.

Table 5. Amitraz Ambient Monitoring Results

Log-#	Sample ID	Start Date/Time	End Date/Time	Sample Time (min.)	Sample Time (hours)	Sample Volume (m3)	Amitraz Sample Results			Data Flags
							ng/sample	(ng/m3)	*(pptv)	
57	WES10	8/04/99 10:45	8/05/99 10:45	1440	24.0	43.2	<MDL	<MDL	<MDL	
58	WES10D	8/04/99 10:45	8/05/99 10:45	1440	24.0	43.2	<MDL	<MDL	<MDL	
59	HUR10	8/04/99 11:30	8/05/99 11:30	1440	24.0	43.2	<MDL	<MDL	<MDL	
60	HUR10D	8/04/99 11:30	8/05/99 11:30	1440	24.0	43.2	<MDL	<MDL	<MDL	4
61	SES10	8/04/99 12:35	8/05/99 12:35	1440	24.0	43.2	<MDL	<MDL	<MDL	4
62	SES10D	8/04/99 12:35	8/05/99 12:35	1440	24.0	43.2	<MDL	<MDL	<MDL	4
63	LHS10	8/04/99 12:55	8/05/99 12:55	1440	24.0	43.2	<MDL	<MDL	<MDL	
64	LHS10D	8/04/99 12:55	8/05/99 12:55	1440	24.0	43.2	<MDL	<MDL	<MDL	
65	ARB10	8/04/99 15:05	8/05/99 15:05	1440	24.0	43.2	<MDL	<MDL	<MDL	
66	ARB10D	8/04/99 15:05	8/05/99 15:05	1440	24.0	43.2	<MDL	<MDL	<MDL	
67	WES11	8/05/99 10:45	8/06/99 10:45	1440	24.0	43.2	<MDL	<MDL	<MDL	
68	HUR11	8/05/99 11:30	8/06/99 11:30	1440	24.0	43.2	<MDL	<MDL	<MDL	
69	SES11	8/05/99 12:30	8/06/99 12:25	1435	23.9	43.0	<MDL	<MDL	<MDL	
70	LHS11	8/05/99 12:55	8/06/99 12:55	1440	24.0	43.2	<MDL	<MDL	<MDL	4
71	ARB11	8/05/99 15:05	8/06/99 15:00	1435	23.9	43.1	<MDL	<MDL	<MDL	
72	HEL12	8/09/99 10:00	8/10/99 10:00	1440	24.0	43.2	<MDL	<MDL	<MDL	
73	WES12	8/09/99 10:25	8/10/99 10:25	1440	24.0	43.2	<MDL	<MDL	<MDL	
74	HUR12	8/09/99 11:10	8/10/99 11:05	1435	23.9	43.0	<MDL	<MDL	<MDL	
75	LHS12	8/09/99 11:45	8/10/99 11:45	1440	24.0	43.2	<MDL	<MDL	<MDL	
76	SES12	8/09/99 12:05	8/10/99 12:05	1440	24.0	43.2	<MDL	<MDL	<MDL	4
77	ARB12	8/09/99 15:30	8/10/99 15:30	1440	24.0	43.2	<MDL	<MDL	<MDL	
78	TB2	8/09/99 15:30	8/09/99 15:30	NA	NA	NA	<MDL	NA	NA	
79	HEL13	8/10/99 10:00	8/11/99 10:15	1455	24.3	43.7	<MDL	<MDL	<MDL	4
80	HEL13D	8/10/99 10:00	8/11/99 10:15	1455	24.3	43.7	<MDL	<MDL	<MDL	4
81	WES13	8/10/99 10:25	8/11/99 10:40	1455	24.2	43.6	<MDL	<MDL	<MDL	4
82	WES13D	NA	NA	NA	NA	NA	NA	NA	NA	2
83	HUR13	8/10/99 11:05	8/11/99 11:15	1450	24.2	43.5	<MDL	<MDL	<MDL	4
84	HUR13D	8/10/99 11:05	8/11/99 11:15	1450	24.2	43.5	<MDL	<MDL	<MDL	4

MDL = 16 ng/sample
Det = <EQL of 80 ng/sample but ≥MDL
* pptv at 1 atm and 25 C
NA = Not Applicable

1. Sample Duration was > 24 hours.
2. No sample.
3. Samples were not on dry ice on delivery.
4. End flow rates were >10% different from the start rate.

Table 5. Amitraz Ambient Monitoring Results

Log-#	Sample ID	Start Date/Time	End Date/Time	Sample Time (min.)	Sample Time (hours)	Sample Volume (m3)	Amitraz Sample Results			Data Flags
							ng/sample	(ng/m3)	*(pptv)	
85	LHS13	8/10/99 11:50	8/11/99 11:50	1440	24.0	43.2	<MDL	<MDL	<MDL	4
86	LHS13D	8/10/99 11:50	8/11/99 11:50	1440	24.0	43.2	<MDL	<MDL	<MDL	4
87	SES13	8/10/99 12:10	8/11/99 12:10	1440	24.0	43.2	<MDL	<MDL	<MDL	4
88	SES13D	8/10/99 12:10	8/11/99 12:10	1440	24.0	43.2	<MDL	<MDL	<MDL	4
89	ARB13	8/10/99 16:45	8/11/99 16:45	1440	24.0	43.2	<MDL	<MDL	<MDL	4
90	ARB13D	8/10/99 16:45	8/11/99 16:45	1440	24.0	43.2	<MDL	<MDL	<MDL	4
91	HEL14	8/11/99 10:25	8/12/99 10:25	1440	24.0	43.2	<MDL	<MDL	<MDL	4
92	HUR14	8/11/99 11:20	8/12/99 11:25	1445	24.1	43.4	<MDL	<MDL	<MDL	4
93	LHS14	8/11/99 12:10	8/12/99 12:10	1440	24.0	43.2	<MDL	<MDL	<MDL	4
94	SES14	8/11/99 12:50	8/12/99 12:50	1440	24.0	43.2	<MDL	<MDL	<MDL	
95	ARB14	8/11/99 14:50	8/12/99 14:50	1440	24.0	43.2	<MDL	<MDL	<MDL	
96	WES14	8/11/99 10:50	8/12/99 10:50	1440	24.0	43.2	Det	Det	Det	
97	HEL15	8/12/99 10:25	8/13/99 10:25	1440	24.0	43.2	<MDL	<MDL	<MDL	
98	WES15	8/12/99 10:50	8/13/99 10:50	1440	24.0	43.2	<MDL	<MDL	<MDL	
99	HUR15	8/12/99 11:30	8/13/99 11:30	1440	24.0	43.2	<MDL	<MDL	<MDL	
100	LHS15	8/12/99 12:10	8/13/99 12:10	1440	24.0	43.2	<MDL	<MDL	<MDL	
101	SES15	8/12/99 12:50	8/13/99 12:50	1440	24.0	43.2	<MDL	<MDL	<MDL	
102	ARB15	8/12/99 16:20	8/13/99 16:20	1440	24.0	43.2	<MDL	<MDL	<MDL	
103	HEL16	8/16/99 10:30	8/17/99 10:35	1445	24.1	43.3	<MDL	<MDL	<MDL	4
104	WES16	8/16/99 11:00	8/17/99 11:00	1440	24.0	43.2	<MDL	<MDL	<MDL	
105	HUR16	8/16/99 11:40	8/18/99 11:45	2885	48.1	86.6	<MDL	<MDL	<MDL	1
106	SES16	8/16/99 12:10	8/17/99 12:10	1440	24.0	43.2	<MDL	<MDL	<MDL	
107	LHS16	8/16/99 12:40	8/17/99 12:50	1450	24.2	43.5	<MDL	<MDL	<MDL	4
108	ARB16	8/16/99 15:35	8/17/99 15:45	1450	24.2	43.5	<MDL	<MDL	<MDL	
109	HEL17	8/17/99 10:35	8/18/99 10:35	1440	24.0	43.2	<MDL	<MDL	<MDL	4
110	HEL17D	8/17/99 10:35	8/18/99 10:35	1440	24.0	43.2	<MDL	<MDL	<MDL	
111	WES17	8/17/99 11:05	8/18/99 11:05	1440	24.0	43.2	<MDL	<MDL	<MDL	4
112	WES17D	8/17/99 11:05	8/18/99 11:05	1440	24.0	43.2	<MDL	<MDL	<MDL	4

MDL = 16 ng/sample
Det = <EQL of 80 ng/sample but ≥MDL
* pptv at 1 atm and 25 C
NA = Not Applicable

1. Sample Duration was > 24 hours.
2. No sample.
3. Samples were not on dry ice on delivery.
4. End flow rates were >10% different from the start rate.

Table 5. Amitraz Ambient Monitoring Results

Log-#	Sample ID	Start Date/Time	End Date/Time	Sample Time (min.)	Sample Time (hours)	Sample Volume (m3)	Amitraz Sample Results			Data Flags
							ng/sample	(ng/m3)	*(pptv)	
113	HUR17	NA	NA	NA	NA	NA	NA	NA	NA	2
114	HUR17D	NA	NA	NA	NA	NA	NA	NA	NA	2
115	SES17	8/17/99 12:20	8/18/99 12:50	1470	24.5	44.1	<MDL	<MDL	<MDL	
116	SES17D	8/17/99 12:10	8/18/99 12:50	1480	24.7	44.4	<MDL	<MDL	<MDL	
117	LHS17	8/17/99 12:50	8/18/99 13:30	1480	24.7	44.4	<MDL	<MDL	<MDL	
118	LHS17D	8/17/99 12:50	8/18/99 13:30	1480	24.7	44.4	<MDL	<MDL	<MDL	
119	ARB17	8/17/99 15:45	8/18/99 16:25	1480	24.7	44.4	<MDL	<MDL	<MDL	
120	ARB17D	8/17/99 15:45	8/18/99 16:25	1480	24.7	44.4	<MDL	<MDL	<MDL	
121	HEL18	8/18/99 10:35	8/19/99 08:35	1320	22.0	39.6	<MDL	<MDL	<MDL	4
122	WES18	8/18/99 11:05	8/19/99 08:20	1275	21.2	38.2	<MDL	<MDL	<MDL	
123	HUR18	8/18/99 11:45	8/19/99 08:45	1260	21.0	37.8	<MDL	<MDL	<MDL	
124	HUR18D	8/18/99 11:45	8/19/99 08:45	1260	21.0	37.8	<MDL	<MDL	<MDL	4
125	SES18	8/18/99 12:50	8/19/99 10:00	1270	21.2	38.1	<MDL	<MDL	<MDL	
126	LHS18	8/18/99 13:35	8/19/99 11:00	1285	21.4	38.6	<MDL	<MDL	<MDL	4
127	ARB18	8/18/99 15:00	8/19/99 15:00	1440	24.0	43.2	<MDL	<MDL	<MDL	
128	HEL19	8/19/99 07:55	8/20/99 10:20	1585	26.4	47.6	<MDL	<MDL	<MDL	
129	WES19	8/19/99 08:20	8/20/99 10:40	1580	26.3	47.4	<MDL	<MDL	<MDL	1,4
130	HUR19	8/19/99 08:45	8/20/99 11:10	1585	26.4	47.6	<MDL	<MDL	<MDL	1
131	LHS19	8/19/99 09:35	8/20/99 11:50	1575	26.3	47.3	<MDL	<MDL	<MDL	1,4
132	SES19	8/19/99 10:00	8/20/99 12:20	1580	26.3	47.4	<MDL	<MDL	<MDL	1
133	ARB19	8/19/99 15:00	8/20/99 15:45	1485	24.8	44.6	<MDL	<MDL	<MDL	
134	HEL20	8/23/99 10:30	8/24/99 10:20	1430	23.8	42.9	<MDL	<MDL	<MDL	4
135	WES20	8/23/99 10:50	8/24/99 10:40	1430	23.8	42.9	Det	Det	Det	4
136	HUR20	8/23/99 11:30	8/24/99 11:20	1430	23.8	42.9	<MDL	<MDL	<MDL	4
137	SES20	8/23/99 12:45	8/24/99 12:35	1430	23.8	42.9	<MDL	<MDL	<MDL	
138	LHS20	8/23/99 12:20	8/24/99 12:10	1430	23.8	42.9	<MDL	<MDL	<MDL	4
139	ARB20	8/23/99 15:50	8/24/99 15:40	1430	23.8	42.9	<MDL	<MDL	<MDL	
140	TB3	8/23/99 12:20	8/23/99 12:20	NA	NA	NA	<MDL	NA	NA	

MDL = 16 ng/sample
Det = <EQL of 80 ng/sample but ≥MDL
*pptv at 1 atm and 25 C
NA = Not Applicable

1. Sample Duration was > 24 hours.
2. No sample.
3. Samples were not on dry ice on delivery.
4. End flow rates were >10% different from the start rate.

Table 5. Amitraz Ambient Monitoring Results

Log-#	Sample ID	Start Date/Time	End Date/Time	Sample Time (min.)	Sample Time (hours)	Sample Volume (m3)	Amitraz Sample Results			Data Flags
							ng/sample	(ng/m3)	*(pptv)	
141	HEL21	8/24/99 10:20	8/25/99 10:30	1450	24.2	43.5	<MDL	<MDL	<MDL	
142	HEL21D	8/24/99 10:20	8/25/99 10:30	1450	24.2	43.5	<MDL	<MDL	<MDL	4
143	WES21	8/24/99 10:40	8/25/99 10:50	1450	24.2	43.5	<MDL	<MDL	<MDL	4
144	WES21D	8/24/99 10:40	8/25/99 10:50	1450	24.2	43.5	<MDL	<MDL	<MDL	4
145	HUR21	8/24/99 11:20	8/25/99 11:30	1450	24.2	43.5	<MDL	<MDL	<MDL	
146	HUR21D	8/24/99 11:20	8/25/99 11:30	1450	24.2	43.5	<MDL	<MDL	<MDL	
147	SES21	8/24/99 12:35	8/25/99 12:30	1435	23.9	43.1	<MDL	<MDL	<MDL	
148	SES21D	8/24/99 12:35	8/25/99 12:30	1435	23.9	43.1	<MDL	<MDL	<MDL	
149	LHS21	8/24/99 12:10	8/25/99 12:10	1440	24.0	43.2	<MDL	<MDL	<MDL	
150	LHS21D	8/24/99 12:10	8/25/99 12:10	1440	24.0	43.2	<MDL	<MDL	<MDL	
151	ARB21	8/24/99 15:40	8/25/99 15:40	1440	24.0	43.2	<MDL	<MDL	<MDL	
152	ARB21D	8/24/99 15:40	8/25/99 15:40	1440	24.0	43.2	<MDL	<MDL	<MDL	
153	HEL22	8/25/99 10:20	8/26/99 10:20	1440	24.0	43.2	<MDL	<MDL	<MDL	
154	WES22	8/25/99 10:50	8/26/99 10:50	1440	24.0	43.2	<MDL	<MDL	<MDL	
155	HUR22	8/25/99 11:20	8/26/99 11:20	1440	24.0	43.2	<MDL	<MDL	<MDL	
156	SES22	8/25/99 12:35	8/26/99 12:35	1440	24.0	43.2	<MDL	<MDL	<MDL	
157	LHS22	8/25/99 12:10	8/26/99 12:10	1440	24.0	43.2	<MDL	<MDL	<MDL	
158	ARB22	8/25/99 15:30	8/26/99 15:30	1440	24.0	43.2	<MDL	<MDL	<MDL	
161	HEL23	8/26/99 10:20	8/27/99 10:30	1450	24.2	43.5	<MDL	<MDL	<MDL	4
162	WES23	8/26/99 10:50	8/27/99 10:50	1440	24.0	43.2	<MDL	<MDL	<MDL	
163	HUR23	8/26/99 11:20	8/27/99 11:20	1440	24.0	43.2	<MDL	<MDL	<MDL	4
164	SES23	NA	NA	NA	NA	NA	NA	NA	NA	2
165	LHS23	8/26/99 12:10	8/27/99 12:10	1440	24.0	43.2	<MDL	<MDL	<MDL	4
166	ARB23	NA	NA	NA	NA	NA	NA	NA	NA	2

MDL = 16 ng/sample
Det = <EQL of 80 ng/sample but ≥MDL
* pptv at 1 atm and 25 C
NA = Not Applicable

1. Sample Duration was > 24 hours.
2. No sample.
3. Samples were not on dry ice on delivery.
4. End flow rates were >10% different from the start rate.

Table 6. Summary of Amitraz Ambient Monitoring Results (ng/m3)

Sample Start Date	Trip Blank	HEL	WES	HUR	SES	LHS	ARB
07/19/99		NA	<MDL	<MDL	<MDL	<MDL	<MDL
07/20/99		NA	<MDL	<MDL	<MDL	<MDL	<MDL
07/21/99		NA	<MDL	<MDL	<MDL	<MDL	<MDL
07/22/99		NA	<MDL	<MDL	<MDL	<MDL	<MDL
07/26/99		NA	<MDL	<MDL	<MDL	<MDL	<MDL
07/28/99		NA	<MDL	<MDL	<MDL	<MDL	<MDL
07/29/99		NA	<MDL	<MDL	<MDL	<MDL	<MDL
08/02/99	<MDL	NA	<MDL	<MDL	<MDL	<MDL	<MDL
08/03/99		NA	<MDL	<MDL	<MDL	<MDL	<MDL
08/04/99		NA	<MDL	<MDL	<MDL	<MDL	<MDL
08/05/99		NA	<MDL	<MDL	<MDL	<MDL	<MDL
08/09/99	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
08/10/99		<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
08/11/99		<MDL	Det	<MDL	<MDL	<MDL	<MDL
08/12/99		<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
08/16/99		<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
08/17/99		<MDL	<MDL	NA	<MDL	<MDL	<MDL
08/18/99		<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
08/19/99		<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
08/23/99	<MDL	<MDL	Det	<MDL	<MDL	<MDL	<MDL
08/24/99		<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
08/25/99		<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
08/26/99		<MDL	<MDL	<MDL	NA	<MDL	NA
Maximum		<MDL	Det	<MDL	<MDL	<MDL	<MDL
Average		NA	NA	NA	NA	NA	NA
# Samples		12	23	22	22	23	22
# >EQL		0	0	0	0	0	0
# Det		0	2	0	0	0	0
# <MDL		12	21	22	22	23	22

MDL = 16 ng/sample
Det = <EQL of 80 ng/sample but ≥MDL
NA = Not Applicable

Table 7. Amitraz Application *Trip* Spike Results

Sample ID	Amitraz Amount (ng)	Expected Amount (ng)	Percent Recovery
PTS813-1	164	200	82%
PTS813-2	168	200	84%
PTS813-3	158	200	79%
PTS813-4	168	200	84%
		Ave.=	82%

Table 8. Amitraz Application *Field* Spike Results

Sample ID	Amitraz Amount (ng)	Background* Amount (ng)	Corrected Amount (ng)	Expected Amount (ng)	Percent Recovery
NFS1	249	<MDL	249	200	125%
WFS2	294	<MDL	294	200	147%
SFS3	248	<MDL	248	200	124%
EFS4	244	<MDL	244	200	122%
				Ave.=	129%

*Amount of amitraz found in the collocated background sample.

MDL = 16 ng/sample
Det = <EQL of 80 ng/sample but ≥MDL
NA = Not Applicable

Table 9. Amitraz Ambient *Lab* Spike Results

Sample ID	Amitraz Amount (ng)	Expected Amount (ng)	Percent Recovery
PLS813-1	148	200	74%
PLS813-2	193	200	97%
PLS813-3	233	200	117%
PLS813-4	220	200	110%
		Ave.=	99%

Table 10. Amitraz Ambient *Trip* Spike Results

Sample ID	Amitraz Amount (ng)	Expected Amount (ng)	Percent Recovery
PTS813-1	210	200	105%
PTS813-2	143	200	72%
PTS813-3	190	200	95%
PTS813-4	182	200	91%
PFS813-3	186	200	93%
PFS813-4	212	200	106%
		Ave.=	94%

PFS813-3 and -4 were originally intended to be field spikes but the field crew did not pull ambient air through these spiked sample cartridges.

Table 11. Amitraz Ambient *Field* Spike Results

Sample ID	Amitraz Amount (ng)	Background* Amount (ng)	Corrected Amount (ng)	Expected Amount (ng)	Percent Recovery
PFS813-1	241	<MDL	241	200	121%
PFS813-2	NA	<MDL	NA	NA	NA

*Amount of amitraz found in the collocated ambient sample.

Sample PFS813-2 was broken during extraction.

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

APPENDICES

FOR THE

Report for the Application (Fresno County) and Ambient (Fresno/Kings Counties) Air Monitoring for Amitraz

Engineering and Laboratory Branch

Monitoring and Laboratory Division

Project No. C98-007 (Application)
C98-008 (Ambient)

Date: July 11, 2000

APPENDIX I

SAMPLING PROTOCOL

Kevin

Air Resources Board

Alan C. Lloyd, Ph.D.
Chairman
2020 L Street • P.O. Box 2815 • Sacramento, California 95812 •

inston H. Hickox
Secretary for Environmental Protection

Gray Davis
Governor

MEMORANDUM

TO: Douglas Okumura, Acting Assistant Director
Division of Enforcement, Environmental
Monitoring and Data Management
Department of Pesticide Regulation

FROM: George Lew, Chief
Engineering and Laboratory Branch
Monitoring and Laboratory Division

DATE: May 17, 1999

SUBJECT: DRAFT PROTOCOL FOR THE 1999 AMITRAZ AIR MONITORING IN KINGS, FRESNO AND YUBA COUNTIES

Attached for your review is the draft "Protocol for the Application (Yuba County) and Ambient (Kings and Fresno Counties) Air Monitoring of Amitraz." We plan to conduct the application study sometime in June and so would appreciate comments on the draft protocol by June 1, 1999.

For the application study (June), sample cartridges will be doubled-up at each sampling station. The exposed resin from the duplicate samples will be composited (mixed together) and extracted as one sample. This procedure will effectively double the sample volume collected per sample. This extra sampling is being performed in an effort to meet the DPR target quantitation limit of 0.2 pptv. We are working with SKC West, the manufacturer of the XAD-2 sampling cartridges that we use, to develop a larger custom-made sampling cartridge that can accommodate a flow rate of 6 Lpm. If this new cartridge is available it will be used for the July/August ambient monitoring study. Collocated samples will be collected as per normal procedure.

If you or your staff have questions or need further information, please contact me at (916) 263-1630 or Kevin Mongar at (916) 263-2063.

Attachment

cc: Ray Menebroker, SSD (w/Attachment)
Pam Wales, DPR (w/Attachment)

bcc: Lynn Baker, SSD (w/Attachment)
Bill Loscutoff, MLD
Michael Spears, MLD (w/Attachment)
Pete Ouchida, AQSB (w/Attachment)
Peter Venturini, SSD

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

DRAFT

Protocol for the Application (Yuba County) and Ambient (Kings and Fresno Counties) Air Monitoring of Amitraz

Engineering and Laboratory Branch
Monitoring and Laboratory Division

Project No.
C98-008 Ambient
C98-007 Application

Date: May 17, 1999

APPROVED:

_____
Kevin Mongar, Project Engineer

_____
Cynthia L. Castronovo, Manager
Testing Section

_____
George Lew, Chief
Engineering and Laboratory Branch

This protocol has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

**Protocol for the Application (Yuba County)
and Ambient (Kings and Fresno Counties)
Air Monitoring of Amitraz**

I. Introduction

At the request (August 1, 1997 Memorandum, Sanders to Lew) of the California Department of Pesticide Regulation (DPR), the Air Resources Board (ARB) staff will determine airborne concentrations of the pesticide amitraz in Kings and Fresno Counties over a six week ambient monitoring program and in Yuba County over a three day application monitoring program. This monitoring will be done to fulfill the requirements of AB 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5) which requires the ARB "to document the level of airborne emissions .... of pesticides which may be determined to pose a present or potential hazard..." when requested by the DPR. Monitoring is being conducted to coincide with the use of amitraz as an insecticide and miticide on pears (application) and cotton (ambient).

The draft method development results and "Standard Operating Procedures for the Analysis of Amitraz in Ambient Air" were not yet available at the time of submittal of this draft protocol. The SOP will be included in the final protocol.

The sampling and analysis for amitraz will follow the procedures and quality assurance guidelines described in the "Quality Assurance Plan for Pesticide Air Monitoring" (May 11, 1999 version)(Attachment I).

II. Chemical Properties of Amitraz

The following information on the physical/chemical properties of amitraz, (N'(2,4-dimethylphenyl)-N-[[(2,4-dimethylphenyl)imino] methyle]-N-methylmethanimidamide), was obtained from the August 1, 1997 memorandum "Air Monitoring Recommendation for Amitraz".

Amitraz (CAS:33089-61-1) exists as colorless, odorless monoclinic needles. Amitraz has a molecular formula of $C_{19}H_{23}N_3$, and a molecular weight of 293.4 g/mole. It has a water solubility of about 1 mg/L at room temperature, a Henry's Constant of 1.48×10^{-7} atm·m^3/mol at 20-25 °C, and a vapor pressure of 0.051 mPa at 20 °C. Amitraz is soluble in most organic solvents; it's solubility is 300 g/L in acetone, toluene and xylene.

Amitraz is stable to heat. The reported half-life in buffered aqueous solution (pH 7) is about 6 hours at 20 °C. Ultraviolet light appears to have little effect on stability. In soil, amitraz decomposes rapidly under aerobic conditions; its half-life in soil < 1 day. Degradation occurs more rapidly in acid than in neutral or alkaline soils.

The acute oral LD_{50} of amitraz for rats is 800 mg/kg and is >1600 mg/kg for mice. It's acute inhalation LC_{50} (6 hours) for rats is 65 mg/L air. The LC_{50} (96 hour) for rainbow trout is 2.7-4.0 mg/L and 1.3 mg/L for bluegill sunfish. It exhibits a low toxicity to bees and other predatory insects. Amitraz entered the risk assessment process at DPR under SB 950 (Birth Defect Prevention Act of 1984) based on potential oncogenicity, reproductive and mutagenic effects.

III. Sampling

Samples will be collected by passing a measured volume of ambient air through XAD-2 resin. The sample tree is shown in Figure 1. The exposed XAD-2 resin tubes (SKC #226-30-06) are stored in an ice chest (on dry ice) or in a freezer until desorbed with acetonitrile. The flow rate of 3 Lpm will be accurately measured and the sampling system operated continuously for 24 hours with the exact operating interval noted in the log book. The resin tubes will be protected from direct sunlight and supported about 1.5 meters above the ground during application monitoring sampling periods and 1.5 meters above roof tops for the ambient monitoring. At the end of each sampling period, the tubes will be capped and placed in culture tubes with an identification label affixed. Subsequent to sampling, the sample tubes will be transported on dry ice, as soon as reasonably possible, to the ARB Engineering and Laboratory Branch laboratory for analysis. The samples will be stored in the freezer or extracted/analyzed immediately.

A rotameter is used to control and monitor sample flow rates. Samplers will be leak checked prior to and after each sampling period with the sampling cartridges installed. Any change in the flow rates will be recorded in the field log book. The field log book will also be used to record start and stop times, start and stop flow rates, sample identifications and any other significant data.

For the application study (June), sample cartridges will be doubled-up at each sampling station. The exposed resin from the duplicate samples will be composited (mixed together) and extracted as one sample. This procedure will effectively double the sample volume collected per sample. This extra sampling is being performed in an effort to meet the DPR target quantitation limit of 0.2 pptv. We are working with SKC West, the manufacturer of the XAD-2 sampling cartridges that we use, to develop a larger custom-made sampling cartridge that can accommodate a flow rate of 6 Lpm. If this new cartridge is available it will be used for the July/August ambient monitoring study. Collocated samples will be collected as per normal procedure.

Ambient Monitoring

The use patterns for amitraz suggest that ambient monitoring can occur in Kings and Fresno Counties during the months of July and August. Four sampling sites will be selected in relatively high-population areas or in areas frequented by people. At each site, 24 discrete 24-hour samples will be taken during the sampling period. Background samples will be collected in

an urban area distant to amitraz applications. Replicate (collocated) samples will be collected for six dates (each Wednesday) at each sampling location.

The sites will be selected by ARB personnel from the areas of Kings and Fresno Counties where cotton farming is predominant. Sites will be selected for their proximity to the fields with considerations for both accessibility and security of the sampling equipment. The sites are near areas of historical use of amitraz as per the use maps supplied by DPR. ARB staff understands that DPR staff will verify and quantify the actual use of amitraz that takes place during the study when the information becomes available.

The samples will be collected by ARB personnel over a six week period from (tentatively) July 19- August 27, 1999. 24-hour samples will be taken Monday through Friday (4 samples/week) at a flow rate of 3 (or 6) Lpm.

Application Monitoring

The use pattern for amitraz suggests that application-site monitoring should be conducted during the months of May or June in Yuba County, and that the monitoring be associated with applications of amitraz to pears at a rate of about 1.5 pounds per acre. Individual application monitoring schedules will vary based on the type and length of application but will follow the schedule guidelines outlined below in TABLE 2. Ideally, the monitoring study will include samples taken before, during and for approximately 72 hours following application.

TABLE 2. GUIDELINES FOR APPLICATION SAMPLING SCHEDULE

Sample period begins:	Sample duration time
Background (pre-application)	Minimum of 12 hours
During application	Length of application time
End of application	1 hour (or up to 1 hour before sunset) [1]
1 hour post-application	2 hours (or up to 1 hour before sunset) [1]
3 hour post-application	3 hours (or up to 1 hour before sunset) [1]
6 hour post-application	6 hours (or up to 1 hour before sunset) [1]
1 hour before sunset	Overnight[2] (until 1 hour after sunrise)
1 hour after sunrise	Daytime (until 1 hour before sunset)
1 hour before sunset	Overnight (until 1 hour after sunrise)
1 hour after sunrise	24-hour (until 1 hour after sunrise)

1 These sample duration times will be adjusted depending on length of application and time of sunset.

2 All overnight samples must include the period from one hour before sunset to one hour after sunrise. If the application extends beyond "1 hour before sunset" then the overnight sample

will be started at the end of application.

Occasionally, a pesticide application may occur all day long and over the course of two or more days. In these instances samples are collected during the first daily application, followed by a sample from end of application to 1 hour before sunset, followed by an overnight sample ending at either the start of application or 1 hour after sunrise the next morning (same for second or more application days). Following the end of the application, samples are collected according to the above schedule, starting with the 1-hour sample.

A minimum of four samplers will be positioned, one on each side of the field. A fifth sampler will be collocated at one position (downwind). Since amitraz is extensively used in the area, background (before application) samples should collect enough volume to achieve the recommended target 24-hour quantitation limit of 2.4 ng/m^3 (minimum of 12 hours). Ideally, samplers should be placed at 20 meters from the field. If possible the samplers will be spaced equidistant from the edges of the field.

We will also provide in the monitoring report: 1) An accurate record of the positions of the monitoring equipment with respect to the field, including the exact distance that the sampler is positioned from the field, 2) an accurate drawing of the monitoring site showing the precise location of the meteorological equipment, trees, buildings, etc., 3) meteorological data collected at a minimum of 15 minute intervals including wind speed and direction, humidity, and comments regarding degree of cloud cover, 4) the elevation of each sampling station with respect to the field and 5) the orientation of the field with respect to North (identified as either true or magnetic north). Samples collected during fog episodes will be designated as such.

IV. Analysis

The method development results and draft "Standard Operating Procedures for the Sampling and Analysis of Amitraz in Ambient Air" (SOP) were not yet available at the time of submittal of this draft protocol. The SOP will be included in the final protocol. The procedures will consist of extraction of the XAD-2 with acetonitrile followed by HPLC/UV analysis. The method detection limit (MDL) and estimated quantitation limit (EQL) should be approximately 4 ng per sample and 20 ng per sample respectively. The MDL calculation is: MDL=3.14(S) for n=7 replicate spikes, and the EQL is: EQL=5xMDL. The above MDL and EQL are estimates based on preliminary HPLC work.

VI. Quality Assurance

Field Quality Control for the ambient monitoring will include:

1) Four field spikes (same environmental and experimental conditions as those occurring at the time of ambient sampling). The field spikes will be obtained by sampling ambient air at the background monitoring site for 24-hour periods at 3 Lpm (i.e., collocated with a background sample).

2) Four trip spikes prepared at the same level as the field spikes.

3) Four lab spikes prepared at the same level as the field and trip spikes.

4) Replicate samples will be taken for six dates at each sampling location.

5) A Trip blank will be obtained each week of sampling.

Field Quality Control for the application monitoring will include:

1) Four field spikes (same environmental and experimental conditions as those occurring at the time of ambient sampling). The field spikes will be obtained by sampling ambient air during background monitoring at the application site for the same duration as the background samples at 3 Lpm (i.e., collocated with background samples).

2) Four trip spikes prepared at the same level as the field spikes.

3) Four lab spikes prepared at the same level as the field and trip spikes.

4) Replicate samples will be taken for all samples at one of the sampling locations.

5) A Trip blank will be obtained.

The instrument dependent parameters (reproducibility, linearity and minimum detection limit) will be checked prior to analysis. A chain of custody sheet will accompany all samples. Flow controllers will be calibrated prior to and after sampling in the field.

VII. Personnel

ARB personnel will consist of Kevin Mongar (Project Engineer), an Instrument Technician from the Testing Section and staff of the Air Quality Surveillance Branch, ARB.

ATTACHMENT I

Quality Assurance Plan for Pesticide Air Monitoring

State of California
California Environmental Protection Agency
Air Resources Board

QUALITY ASSURANCE PLAN FOR PESTICIDE AIR MONITORING

Prepared by the

Monitoring and Laboratory Division
Engineering and Laboratory Branch

Revised: May 11, 1999

APPROVED:

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This Quality Assurance Plan has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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QUALITY ASSURANCE PLAN FOR PESTICIDE MONITORING

I. Introduction

At the request of the Department of Pesticide Regulation (DPR), the Air Resources Board (ARB) staff determines the airborne concentrations of specified pesticides following monitoring recommendations established by the DPR. This air monitoring is conducted to fulfill the requirements of AB 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5) which requires the ARB "to document the level of airborne emissions .... of pesticides which may be determined to pose a present or potential hazard..." when requested by the DPR. The documentation of airborne concentrations is usually accomplished through two types of monitoring. The first consists of five to eight weeks of **ambient** monitoring in the general area of, and during the season of, peak use of the specified pesticide. The second is monitoring around the perimeter of a field during and for 72 hours after an **application** has occurred. These are referred to as ambient and application monitoring, respectively. To help clarify the differences between these two monitoring programs, ambient and application are highlighted in bold in this document when the information applies specifically to either program. The purpose of this document is to specify quality assurance activities for the sampling and laboratory analysis of the monitored pesticide.

A. Quality Assurance Policy Statement

It is the policy of the ARB to provide DPR with accurate, relevant and timely air monitoring measurements of airborne pesticide concentrations. The goal of this document is to identify procedures that ensure the implementation of this policy.

B. Quality Assurance Objectives

Quality assurance objectives for pesticide monitoring are as follows.

(1) to establish the necessary quality control activities relating to site selection, method validation, analytical standard operating procedures (SOP), sample collection, sampling and analysis protocol, data reduction and final reports, and;
(2) to assess data quality in terms of precision, accuracy and completeness, and;
(3) to design air monitoring strategies to meet the pesticide target (estimated) quantitation levels as provided by the DPR.

II. Air Monitoring

All sampling will be coordinated through communication with the County Agricultural Commissioner's Office. The local Air Quality Management District (AQMD) or Air Pollution Control District (APCD) will be notified prior to any monitoring. Sample collection will be conducted by staff of the Testing Section or staff of the Air Quality Surveillance Branch of the ARB, or an approved ARB contractor.

A. Siting

The location and time-frame for **ambient** and **application** monitoring are based on direction provided by the DPR in their "Use Information and Air Monitoring Recommendation for Pesticide Active Ingredient" documents. These recommendations are based on historical trends (normally 2 to 3 years prior) and are submitted to the ARB by the DPR approximately 1 year in advance of intended monitoring. The recommendations direct ARB to monitor for a pesticide in specific counties during specific use periods. Pesticide use maps (historical) and histograms are used along with close coordination with staff of the County Agricultural Commissioner's Office to predict areas (and times) of use for the pesticide for the upcoming use year. Approximately one month prior to the scheduled monitoring DPR will reevaluate the historical use trends using the most recent pesticide use data available.

For selection of **ambient** monitoring sites, ARB staff work through authorized representatives of school districts, private companies or city, county or state government agencies. The probe (sampler) siting criteria for **ambient** pesticide monitoring were obtained from the U.S. EPA "Ambient Air Quality Surveillance" criteria (40 CFR, Part 58) and are listed in TABLE 1. As per the DPR monitoring recommendations, three to five sites are chosen. The monitoring objective in choosing these sites is to estimate population exposure in relatively high-population areas or in areas frequented by people (e.g., schools or school district offices, fire stations, or other public buildings). Sampling sites should be located near (in regions of) specific agricultural crops as recommended by the DPR. One additional site is chosen and designated to be an urban area "background" site which is located away from any expected applications. Information will be collected for each site and reported to DPR regarding; 1) the proximity of the each sampler to treated or potentially treated fields, including the distance and direction, and 2) the distance the sampler is located above the ground. Normally the **ambient** samplers will be located on the roof of a one-story building (e.g., at schools) with the sample cartridge located about 1.5 meters above the roof.

Probe siting criteria for placement of samplers around a pesticide **application** are the same as for **ambient** monitoring tests (TABLE I). A minimum of four samplers are positioned, one on each side of the field. A fifth sampler is collocated at one position, normally the downwind side (based on prevailing breezes). Once monitoring has begun, the sampling stations are not moved, even if the wind direction has changed. Ideally, samplers should be placed at a minimum distance of 20 meters from the perimeter of the field and should be equidistant from the field. *These requirements are nearly impossible to meet because of the physical limitations of most application sites. Twenty meters from a potential application field invariably places the sampler on another landowner's property, in another field where tractors and other equipment must operate, or into another orchard where the siting criteria cannot be met. Fences, canals, roads, ditches, railroad tracks, brush, trees, houses, barns, livestock, parked equipment, uncooperative neighbors, etc. are common obstacles. Monitors are placed as far as possible, up to 20 meters, from the field. Attempts are always made to center the samplers on the face of a side of the field. The sampler is placed to maximize the distance from the field and to avoid obstructions bordering the field. Conditions at the site will dictate the actual placement of monitoring stations.* Information is collected and reported to DPR regarding; 1) an accurate record of the positions of the monitoring equipment with respect to the field, including the exact distance that

the sampler is positioned from the field; 2) an accurate drawing of the monitoring site showing the precise location of the meteorological equipment, trees buildings and other obstacles; 3) the elevation of each sampling station with respect to the field and the orientation of the field with respect to North (identified as true or magnetic North). Determination of an appropriate site for an **application** test is based on the "recommendations" provided by the DPR. Parameters used to choose the site are:

1. crop type,
2. minimum field area of 10 acres,
3. minimum application rate (as directed by the DPR),
4. type of application (normally no preference by the DPR),
5. availability of sites on all four sides of the field which meet the criteria in Table 1 and can be sited 20 meters from the perimeter of the field (quite often this is not possible, i.e., normally 4 sites are chosen but they may not all meet the criteria), and
6. accessibility and security of the sampling sites/equipment.

Monitoring sites (fields) are arranged through communication with, and the voluntary cooperation of, applicators, growers or owners for **application** monitoring. Normally, representatives of the County Agricultural Commissioner's Office will make initial contact with the applicators/growers or will at least provide a list of possible candidates.

TABLE 1. PESTICIDE PROBE SITING CRITERIA SUMMARY

Height Above Ground (Meters)		2-15
Minimum Distance from Supporting Structure (Meters)	Vertical	1
	Horizontal	1
Other Spacing Criteria		1. Should be 20 meters from trees.
		2. Distance from sampler to obstacle, such as buildings, must be at least twice the height the obstacle protrudes above the sampler.
		3. Must have unrestricted air flow 270° around sampler.
		4. Samplers at a collocated site (duplicate for quality assurance) should be 2-4 meters apart if samplers are high flow, >20 liters per minute.

B. Schedule

Samples for **ambient** pesticide monitoring will generally be collected over 24-hour periods on a schedule of 4 samples per week (Monday through Friday) for 5 to 7 weeks. Occasionally the normal schedule will be interrupted due to holidays and make-up samples may be collected over weekends.

Individual **application** monitoring schedules will vary based on the type and length of application but will follow the schedule guidelines outlined below in TABLE 2. Ideally, the

monitoring study will include samples taken before, during and for approximately 72 hours following application.

TABLE 2. GUIDELINES FOR APPLICATION SAMPLING SCHEDULE

Sample period begins:	Sample duration time
Background (pre-application)	Minimum of 12 hours
During application	Length of application time
End of application	1 hour (or up to 1 hour before sunset) [1]
1 hour post-application	2 hours (or up to 1 hour before sunset) [1]
3 hour post-application	3 hours (or up to 1 hour before sunset) [1]
6 hour post-application	6 hours (or up to 1 hour before sunset) [1]
1 hour before sunset	Overnight[2] (until 1 hour after sunrise)
1 hour after sunrise	Daytime (until 1 hour before sunset)
1 hour before sunset	Overnight (until 1 hour after sunrise)
1 hour after sunrise	24-hour (until 1 hour after sunrise)

1 These sample duration times will be adjusted depending on length of application and time of sunset.

2 All overnight samples must include the period from one hour before sunset to one hour after sunrise. If the application extends beyond "1 hour before sunset" then the overnight sample will be started at the end of application.

Occasionally, a pesticide application may occur all day long and over the course of two or more days. In these instances samples are collected during the first daily application, followed by a sample from end of application to 1 hour before sunset, followed by an overnight sample ending at either the start of application or 1 hour after sunrise the next morning (same for second or more application days). Following the end of the application, samples are collected according to the above schedule, starting with the 1-hour sample.

C. Meteorological Monitoring

Data on wind speed and direction, barometric pressure, relative humidity and air temperature will be collected during **application** monitoring by use of an on-site meteorological station. The meteorological data will be acquired using a data logger at a minimum of 15 minute intervals (averages). Meteorological systems will be calibrated as specified in the ARB manual, "Air Monitoring Quality Assurance, Volume II, Standard Operating Procedures for Air Quality Monitoring." Meteorological data are not collected for the **ambient** monitoring programs.

III. Method Validation

A. Method Detection Limit

The method detection limit (MDL) is defined as the lowest concentration at which individual measurement results for a specific analyte are statistically different from a blank (that may be zero) with a specified confidence level for a given method and matrix.

MDL is defined as 3.14 x s; where s is equal to the standard deviation of seven replicate spiked samples (e.g., XAD sample cartridges). The spiked samples are prepared and analyzed in the same way as actual samples. The spikes should be prepared at a concentration that is between one to five times the estimated MDL.

B. Estimated Quantitation Limit

The estimated quantitation limit (EQL) is the recommended lowest level for quantitative decisions based on individual measurements for a given method and representative matrix. This EQL is defined as 5 x MDL.

C. Reproducibility

The reproducibility of the method should be determined by performing five replicates at three different concentrations. The lowest level should be at or near the EQL. The average and standard deviation of each set of replicates should be determined and reported.

D. Extraction Efficiency

Extraction efficiency is defined as the amount of pesticide recovered from a spiked sample. Three replicates at two levels and blank should be extracted with the average and standard deviation determined for the replicates. The average amount divided by the amount added multiplied by 100 will give the percent recovery. Recommended recoveries should be between 70-130%.

E. Sampling Efficiency

Sampling efficiency is determined by spiking a sample with a known amount of pesticide. The spiked sample is placed in a sampler and set to the same flow rate and time that samples are collected. At a minimum three replicate spiked samples at a concentration two times the EQL of the method and a collocated background are collected. The samples are extracted and average recovery and standard deviation of the spike samples are determined.

F. Breakthrough

Breakthrough is determined by using a two stage sampling media (usually a filter or resin). The front stage is spiked with a known quantity of the pesticide. The breakthrough study samples are normally spiked at a relatively high level, e.g., at a level that might be observed

during an application study. If time and resources permit, both low and high level spike studies are run. The backup will be the same filter or resin type and placed in series with the front filter or resin. Air is passed through the sampler at the same flow rate and sample time as a real sample (minimum sample time of 24 hours). The front and backstage are recovered and extracted separately. If breakthrough is observed then the sampling strategy must be reviewed, modified and retested before the start of a sampling project.

G. Freezer Storage Stability

Spiked samples should be stored under the same conditions as the samples and for the anticipated time that the samples are stored. Recoveries are determined. A high (either at a level expected during the application study or at the high end of the calibration curve) and a low (1 to 2 times the EQL) concentration set should be studied. A set consists of three replicate spikes each for 3 time intervals.

IV. Field Sampling Quality Control Procedures

Monitoring programs will include the following quality control procedures:

A. Sample Labels

Sample labels will be affixed either directly to the sampling cartridge or will be placed in the individual sample container (e.g., culture tube or zip-lock bag). The sample labels will include at least the following information.

1. Pesticide name and the ARB project number.
2. Log number
3. Sample I.D.
4. Monitoring Location
5. Sampling end date
6. General comments

B. Log Sheets

Field data log sheets will be used to record the sampling log number, sample I.D., start and stop dates, start and stop times, start and end flow rate, initials of individuals conducting sampling, malfunctions, leak checks (at the beginning and end of each sampling period, see Appendix I), weather conditions (e.g., rain) and any other pertinent data which could influence sample results. Refer to Appendix I for a recommended log sheet format.

C. Chain of Custody Forms

Attached as Appendix II is a recommended format for chain of custody (COC) sheets. A COC sheet must accompany any/all samples during transport, transfer or storage. All exchanges of sample possession must be recorded. The laboratory will keep copies of the COCs and

forward the originals to the project engineer. The original COC sheets must be retained in the pesticide project file.

D. Flow Controller Calibration and Audit

Field flow controllers (rotameter, electronic flow controller or critical orifice) shall be calibrated against a referenced standard prior to a monitoring period. This referenced standard (e.g., digital bubble flowmeter or electronic digital mass flowmeter) must be verified, certified or calibrated with respect to a primary standard at least once per year by the Quality Management and Operations Support Branch (QMOSB) of ARB. Appendix V shows an example of a form to document the flow controller calibration results.

A flow audit of the field air samplers will be conducted by the QMOSB before each pesticide monitoring project. If results of this audit indicate a difference from the calibrated values of more than 10%, then the field flow controllers should be rechecked until they meet this objective. A written report of the QMOSB audit results will be included as an appendix in the final monitoring report.

Sampling flow rates should be checked in the field and noted before and after each sampling period. A separate, certified flow meter (i.e., not the one used in the sample train to control flow) will be used to check the flow. The flow rates should be checked after the initial sampling system leak check and before the "end" sampling system leak check.

E. Background Sampling

A background sample will be taken at all sites (4 sides) prior to an **application** test. The duration of the background sample should be sufficient to achieve the pesticide target 24-hour EQL, as directed by the DPR prior to the test, and must be a minimum of twelve hours and up to 24 hours if scheduling permits. This sample will establish if any of the pesticide being monitored is present in the air prior to the application. It also can indicate if other environmental factors are interfering with the detection of the pesticide of concern during analysis.

While one of the sampling sites for **ambient** monitoring is referred to as an "urban area background," it is not a background sample in the conventional sense because the intent is not to find a non-detectable level or a "background" level prior to a particular event (or application). This site is chosen to represent a low probability of finding the pesticide and a high probability of public exposure if significant levels of the pesticide are detected at this urban background site. Detectable levels of some pesticides may be found at an urban area background site if they are marketed for residential as well as commercial/agricultural use. An example of an urban area background site is the ARB air monitoring station in downtown Fresno.

F. Collocated Samples

For both ambient and application monitoring, the method precision will be demonstrated in part by collecting samples from collocated samplers (replicate analysis of samples also relates to method precision). An additional **ambient** sampler will be collocated at each of the sampling

sites. Normally, collocated samples will be collected at each **ambient** site every Wednesday for each week of sampling. The samplers should be located at least two meters apart if they are high volume samplers (>20 Lpm) in order to preclude airflow interference. This consideration is not necessary for low flow samplers. The collocated sampler for **application** monitoring should be positioned at the downwind sampling site where the highest concentrations are expected. The collocated site is not changed after the study starts.

G. Trip Blanks

A trip blank should be included with each batch of samples submitted for analysis. This will usually require one trip blank for an **application** monitoring study and one trip blank per week for an **ambient** monitoring program. Trip blanks are prepared by opening a sampling cartridge (e.g., breaking the ends of an XAD glass tube) in the field followed by normal labeling and sample transport (i.e., along with the samples).

H. Laboratory, Trip and Field Spikes

The *laboratory, trip and field* spikes are prepared, extracted and analyzed at the same time and they are generally all spiked at the same level. The *laboratory* spikes are immediately placed in the laboratory refrigerator (or freezer) and kept there until extraction and analysis. The *trip* spikes are kept in the freezer until transported to the field. The trip spike samples are kept on dry ice in an ice chest (the same one used for the samples) during transport to and from the field and at all times while in the field except for trip spike sample log-in and labeling. The *field* spikes are stored and transported in the same way as the trip spikes. However, field spikes are obtained by sampling ambient air through the spiked cartridge at the same environmental and experimental conditions as those occurring at the time of the study.

Ambient field spikes are collocated (same location, flow rate and sampling period) with a sample collected at the urban background sampling site (to minimize background concentrations). **Ambient** field spikes are normally prepared at a level of approximately 2 times the EQL, or at a level representative of ambient concentrations.

Application study field spikes are collocated with the background samples collected at the four sides of the application site (i.e., one background and one field spike per side). **Application** field spikes are normally prepared at a level close to expected air concentrations. Field spike results are corrected by subtracting the amount of pesticide residue found in the collocated, unspiked sample before calculation of residue recoveries.

I. Transportation of Samples

All samples will be capped, placed in a sample container (e.g., culture tube or zip-lock bag) and placed in an ice chest on dry ice immediately following sample collection and labeling. The samples will remain on dry ice until transferred to the laboratory and will then be stored in the lab refrigerator or freezer. Any special handling procedures will be identified during the method validation and will be outlined in the SOP.

J. Meteorological Station Calibration

Meteorological station calibration procedures will be performed as specified by the ARB manual, "Air Monitoring Quality Assurance, Volume II, Standard Operating Procedures for Air Quality Monitoring."

K. Preventive Measures

To prevent loss of data, spare pumps and other sampling materials should be kept available in the field by the operator. A periodic check of sampling pumps, meteorological instruments, extension cords, etc., should be made by sampling personnel.

V. Analysis

Method development and analysis of all field samples must be conducted by a fully competent laboratory. To ensure the capability of the laboratory, a systems audit may be performed, upon request, by the ARB Quality Management and Operations Support Branch (QMOSB) prior to the first analysis per a pesticide project. After a history of competence is demonstrated, an audit prior to each pesticide project is not necessary. However, during each pesticide project, the spiked samples discussed above should be provided to the laboratory to demonstrate accuracy and precision. These spiked samples will be prepared by qualified ARB laboratory staff.

If using GC/MS, isotope dilution is the recommended method for quantitation. Isotope dilution is where the isotope analog of the target compound is spiked to the sample prior to sample preparation. The internal standard goes through the same sample and analytical steps that the target analyte does thus compensating for losses during sample preparation and instrument variability during analysis. When no isotope is available an internal standard is recommended. An internal standard is spiked to the sample just prior to analysis. The internal standard compensates for instrument variability. If no suitable internal standard is found then an external standard method may be used.

VI. Analytical Quality Control Procedures

A. Mass Spectrometer Tuning (if MS is used)

A daily tune shall be performed using perfluorotributyl amine (PFTBA). The MS should be calibrated to optimize the MS for the mode of operation and type of pesticide analyzed. Documentation and performance criteria shall be specified in the standard operating procedure. A record of the tune for each batch should kept on file. A daily tune must be performed prior to the analysis of an analysis sequence and every 24 hours during an analysis sequence. If longer intervals between tunes are used, then the stability of the MS must be demonstrated during the method development phase and approved prior to the sample analysis.

B. Calibration

Initial Calibration

At the beginning of method development an initial multi-point calibration curve is performed to demonstrate the calibration range of the pesticide analyzed. A typical multi-point calibration consists of 5 different concentrations with a single replicate at each concentration. The calibration range usually should not exceed 40:1 with the lowest level standard at the EQL unless there is no need to measure values as low as the EQL. Depending on the linear range of the analyte, multi-points with other than 5 levels may be used although a multi-point with less than 3 levels is not permitted. Typically a linear calibration is preferred although a dynamic range using a quadratic is acceptable. For quadratic calibration curves quantitation can only be performed within the calibration range. Sample above the calibration curve must be diluted into the calibration range and reanalyzed.

Daily Calibration

Prior to the analysis of a set of samples a calibration must be performed. This calibration is called the daily calibration. The daily calibration is either a multi-point calibration or a mid-point calibration. The mid-point calibration consists of a single calibration at the mid-point of the initial multi-point calibration curve. If the mid-point is within a prescribed range (i.e., within +/- 20% of the original calibration) as determined from the initial calibration then the original initial calibration is still considered valid and the response is replaced. If the mid-point calibration is outside that range then another multi-point calibration must be performed. A calibration check at the same level is also run. If the mid-point calibration and the midpoint calibration check are within a prescribed range (i.e., +/-20%) of each other then analysis can begin. If the calibration check is outside the specified range then the problem must be rectified before analysis can begin.

C. Reagent Blanks.

A reagent (solvent) blank is performed at least for every batch of reagent used. The reagent blank uses the same solvent that was used for the sample preparation. The blank should be free of interferences. If low level contamination of the pesticide residue is found in the reagent blank (as may happen when using isotope dilution), then a reagent blank will be performed before analysis of each batch of samples. A reagent blank must be analyzed after any sample which results in possible carry-over contamination.

D. Laboratory Control Blank.

A laboratory blank is run with each batch of samples. A laboratory control blank (blank sampling media, e.g., resin cartridge or filter) is prepared and analyzed by the same procedures as used for field samples. Laboratory blank results must be no higher than 20% of the lowest value reported.

E. Laboratory Control Spike.

A laboratory control spike (LCS) is a resin cartridge spiked (at the level of the midpoint of the daily calibration runs) with a known amount of standard. The LCS is prepared and analyzed the same way as the samples. Two LCS are performed for each batch of samples. Laboratory control spikes need to be within 40% (100*difference/average) of each other and have recoveries that are +/-30% of the theoretical spiked value. If in the method development stage it is found that the differences or recoveries are larger, then they must be approved by ARB before the analysis can begin.

F. Calibration Check Samples.

A calibration check sample (CCS) is a mid-point standard run after every tenth sample in an analysis set. The purpose of the CCS is to ensure sample drift is within specified values. The CCS sample must be within +/- 25% of its theoretical value. If the standard is outside this range, then the samples associated with that calibration check sample must be reanalyzed. If in the method development stage it is found that the CCS variation is greater than 25%, then the percent variation limit used for the method must be approved by the ELB Branch Chief before the analysis can begin.

G. Duplicate Analysis.

A duplicate analysis is a sample analyzed in duplicate as a measure of analytical precision. Every tenth sample of an analysis set must be run in duplicate.

H. Standard Operating Procedures

Analytical methods must be documented in a Standard Operating Procedure (SOP) before monitoring begins. The recommended format for the SOP is provided in Appendix III. The SOP will include a discussion of all of the procedures outlined above in this section. The SOP will also include a summary of method development results as outlined in Section III above.

VII. Sampling and Analysis Protocol

Prior to conducting any pesticide monitoring, a sampling and analysis protocol, using this document as a guideline, will be written by the ARB staff. The protocol describes the overall monitoring program, the purpose of the monitoring and includes the following topics:

1. Identification of the sample site locations, if possible.

2. Description of the sampling train and a schematic showing the component parts and their relationship to one another in the assembled train, including specifics of the sampling media (e.g., resin type and volume, filter composition, pore size and diameter, catalog number, etc.).

3. Specification of sampling periods and flow rates.

4. Description of the analytical method (SOP included if possible).

5. Tentative test schedule and expected test personnel.

6. Safety information specific to the pesticide monitored.

Specific sampling methods and activities will also be described in the monitoring plan (protocol) for review by ARB and DPR. Procedures which apply to all sampling projects include: (1) sample log sheets (APPENDIX I), (2) chain of custody forms (APPENDIX II), (3) sunlight and rain shields for sample protection during monitoring, (4) sample storage in an ice chest on dry ice until delivery to the laboratory, (5) trip blanks and, (6) laboratory, trip and field spikes. The protocol should include: equipment specifications (when necessary), special sample handling and an outline of sampling procedures. The protocol should specify any procedures unique to a specific pesticide.

VIII. Final Reports and Data Reduction

The mass of pesticide found in each sample should be reported along with the volume of air sampled (from the field data sheet) to calculate the mass per volume for each sample. For each sampling date and site, concentrations should be reported in a table as ug/m^3 (microgram per cubic meter) or ng/m^3 (nanogram per cubic meter). When the pesticide exists in the vapor phase under ambient conditions, the concentration should also be reported as ppbv (parts per billion, by volume) or the appropriate volume-to-volume units at conditions of 1 atmosphere and 25 °C. Collocated samples should be reported separately as raw data, but then averaged and treated as a single sample for any data summaries. For samples where the end flow rate is different from that set at the start of the sampling period, the average of these two flow rates should be used to determine the total sample volume.

The final report should indicate the dates of sampling as well as the dates of laboratory receipt, extraction and analyses. These data can be compared with the stability studies to determine if degradation of the samples has occurred.

Final reports of all monitoring studies are sent to the Department of Pesticide Regulation, the Office of Environmental Health Hazard Assessment, the Department of Health Services, the Agricultural Commissioner's Office, the local AQMD as well as the applicator and/or the grower. Final reports are available to the public by contacting the ARB Engineering and Laboratory Branch.

A. Ambient Reports

The final report for ambient monitoring should include a map of the monitored area which shows nearby towns or communities and their relationship to the monitoring stations, along with a list of the monitoring locations (e.g., name and address of the business or public building)

including the locations Range/Township/ Section. A site description should be completed for any monitoring site which might have characteristics that could affect the monitoring results (e.g., obstructions). For ambient monitoring reports, information on terrain, obstructions and other physical properties which do not conform to the siting criteria or may influence the data should be described. Information will be collected for each site and reported to DPR regarding; 1) the proximity of the each sampler to treated or potentially treated fields, including the distance and direction, and 2) the distance the sampler is located above the ground.

Ambient data should be summarized for each monitoring location by maximum and second maximum concentration, average ("detected" results are factored in as (MDL+EQL)/2, <MDL results are factored in as MDL/2), total number of samples, number of samples above the estimated quantitation limit (EQL), number of samples "detected" and the number of samples below the MDL. For this purpose, collocated samples are averaged and treated as a single sample.

B. Application Reports

Similarly, a map or sketch indicating the general location (nearby towns, highways, etc.) of the field chosen for application monitoring should be included as well as a detailed drawing of the field itself and the relative positions of the monitors. For application monitoring reports, as much data as possible should be collected about the application conditions (e.g., formulation, application rate, acreage applied, length of application and method of application). This may be provided either through a copy of the Notice of Intent, the Pesticide Control Advisor's (PCA) recommendation or completion of the Application Site Checklist (APPENDIX IV). Meteorological data will be reported in 15 minute averages for the application site during the monitoring period. Meteorological and pesticide air concentration data will also be summarized as wind roses for each application sampling period. The raw meteorological data file will also be transferred to DPR on 1.44 mb floppy disk.

C. Quality Assurance

All quality control and quality assurance samples (blanks, spikes, collocated etc.) analyzed by the laboratory must be reported. Results of all method development and/or validation studies (if not contained in the S.O.P.) will also be reported. The results of any quality assurance activities conducted by an agency other than the analytical laboratory should be included in the report as an appendix. This includes analytical audits, system audits and flow rate audits.

APPENDIX I

SAMPLE FIELD LOG BOOK

SAMPLE FIELD LOG BOOK

Project: Pesticide Air Monitoring

Project #:

Log #	Sample ID	Date On/Off	Time On/Off	Start Flow	End Flow	Start Leak Check	End Leak Check	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Techn. Initial

APPENDIX II

CHAIN OF CUSTODY FORM

CHAIN OF CUSTODY FORM
CALIFORNIA AIR RESOURCES BOARD
MONITORING AND LABORATORY DIVISION
P.O. Box 2815, Sacramento CA 95812
PESTICIDE
CHAIN OF CUSTODY

SAMPLE RECORD

Job #: _____ Date: _____
Sample/Run #: _____ Time: _____
Job Name: _____
Sample Location: _____
Type of Sample: _____
Log #'s: _____

ACTION	DATE	TIME	INITIALS		METHOD OF STORAGE
Sample Collected					
			GIVEN BY	TAKEN BY	freezer, ice or dry ice
Transfer					
Transfer					
Transfer					
Transfer					
Transfer					
Transfer					

LOG #	ID #	

RETURN THIS FORM TO: _____

APPENDIX III

ANALYTICAL STANDARD OPERATING PROCEDURE FORMAT

ELEMENTS TO BE INCLUDED IN LABORATORY STANDARD OPERATING PROCEDURES FOR PESTICIDE AIR ANALYSIS

Engineering and Laboratory Branch
Air Resources Board
April 1999

I. SCOPE

A. Description of scope and detection limits of pesticide(s) to be analyzed.
B. Documents and references upon which method is based.
C. Definitions of any special terms must be given.

II. SUMMARY OF METHOD

A. General description of sampling and analytical procedure. Enough information should be included for an experienced analyst to readily recognize the principles of operation.

III. INTERFERENCES AND LIMITATIONS

A. Comments made here should cover both analytical and sampling problems, known and potential.

IV. EQUIPMENT AND CONDITIONS

A. INSTRUMENTATION: As specific a description as possible. Any modifications or improvements of the basic system must have an accompanying schematic. For chromatographic analysis list columns, flow rates, temperatures, detectors, amplifier ranges and attenuations, sample volumes, etc.
B. AUXILIARY APPARATUS: Provide a description of the function and operating conditions. Include a description of the sampling equipment if the equipment is specific to this method. For example, "Vacuum pump, ACME Model 62, capable of maintaining a 1 CFM Air Flow at 10" vacuum."

V. REAGENTS AND MATERIALS

A. Provide a list of all reagents used and specify purity and/or grade.
B. Describe preparation of any special reagents for analysis and sampling.
C. Specify composition, preparation, and concentrations of stock, intermediate, and working standards.
D. Describe in detail any necessary safety precautions for handling and disposition of chemicals.

VI. PROCEDURES

A. FIELD SAMPLING TECHNIQUES

1. Refer to appropriate Field Sampling S.O.P. for exact details of sampling, chain of custody and sample identification procedures.
2. Describe equipment used.
3. List sampling conditions: materials, flow rates, etc.
4. Describe any potential problems and limitations, with means of controlling such problems.
5. Describe any methods used to split samples for other types of analyses, if necessary.

B. LABORATORY SAMPLE PREPARATION/PRETREATMENT TECHNIQUES

1. Describe (or refer to an appropriate section of a Laboratory Quality Control Manual) a protocol for sample log-in procedures, including document control and sample examination for damage. Any possible hazards due to toxic or flammable chemicals must be clearly identified. Any sample storage requirements, such as immediate refrigeration or protection for light must be noted.
2. Describe any methods used for preconcentration, dilution clean-up filtration, extraction, concentration, etc., after the sample is received from the field.

C. ANAYSIS

1. Describe as clearly as possible the exact instrument configuration and set-up techniques
2. Describe analysis blank and calibration procedure with associated limits on precision and accuracy. Describe analysis of Control Samples and limits of the resulting data. Describe steps taken in an "out-of-control" situation. Specify the format and location of recorded calibration and Control Sample data.
3. Describe sample analysis. Description must include an example of expected data (for example, a sample chromatogram with all components of interest labeled).
4. Give calculation procedures for results. Describe data recording and data submittal.

VII. PERFORMANCE CRITERIA

A. Describe frequency of duplicate analyses, spikes, field blanks, and acceptable limits of each.
B. Describe frequency of multiple standard analyses to check method linearity and detection limit.
C. If confirmatory method is used, refer to specific S.O.P.

VIII. METHOD VALIDATION

Validation testing should provide an assessment of accuracy, precision, interferences, method recovery, method detection limit and estimated quantitation limit. Method documentation should include confirmation testing with another method when possible, and quality control activities necessary to routinely monitor data quality control such as use of control samples, control charts, use of surrogates to verify individual sample recovery, field blanks, lab blanks and duplicate analysis. All data should be properly recorded in a laboratory notebook.

The method should include the frequency of analysis for quality control samples. Analysis of quality control samples are recommended before each day of laboratory analysis and after every tenth sample. Control samples should be found to be within control limits previously established by the lab performing the analysis. If results are outside the control limits, the method should be reviewed, the instrument recalibrated and the control sample reanalyzed.

All quality control studies should be completed prior to sampling and include recovery data from at least three samples spiked at least two concentrations. Instrument variability should be assessed with three replicate injections of a single sample at each of the spiked concentrations. A stability study should be done with triplicate spiked samples being stored under actual conditions and analyzed at appropriate time internals. This study should be conducted for a minimum period of time equal to the anticipated storage period. Prior to each sampling study, a conversion/collection efficiency study should be conducted under field conditions (drawing ambient air through spiked sample media at actual flow rates for the recommended sampling time) with three replicates at two spiked concentrations and a blank. Breakthrough studies should also be conducted to determine the capacity of the adsorbent material if high levels of pesticide are expected or if the suitability of the adsorbent is uncertain. The following data will be included in the SOP.

A. A table describing linearity (correlation coefficients), accuracy (method bias), precision (standard deviations at all levels analyzed), and detection.
B. Data on sampling efficiencies, stability, pertinent breakdown products, break through volumes and desorption efficiencies.
C. Data on storage stability and conditions for samples and standards.
D. References to quality assurance information derived from published and/or interlaboratory sources if available.

APPENDIX IV

APPLICATION CHECKLIST

APPLICATION CHECKLIST

1. Pesticide:
2. County:
3. Crop:
4. Field Address:
5. Field Location (R/T/S):
6. Field Size (acres):
7. Contact Person:
8. Background Monitoring Period:
9. Target EQL Met?:
10. Product Applied:
11. Application Rate:
12. Comments on Tank Mix:
13. Method of Application (ground, air, irrigation, injection, tarping etc.):
14. Start of Application:
15. End of Application:
16. Pattern of Application: (e.g., east to west):
17. Weather Conditions:
18. Met Station Location (and elevation):
19. Any Other Applications in Area:
20. Sampler Elevations:

___ Camera pictures of each sampler from all 4 directions
___ Camcorder video of each sampler in relation to field and surroundings
___ Rotameter #s logged
___ Check dimensions of field with known acreage (43560 ft^2/acre) & compare sides
___ Crops around field labeled on diagram

FLOW CONTROLLER; 1-POINT FLOW CALIBRATION SHEET

Project: Pre: _____ Post: _____ Project #: _____ Date: _____

Desired Flow Rate: _____ Calib. by: _____ (name)

BUBBLEMETER READINGS

Controller ID:					
Controller Set:					
-Readings:					
-Readings:					
-Readings:					
Average:					
Deviation:					
Controller ID:					
Controller Set:					
-Readings:					
-Readings:					
-Readings:					
Average:					
Deviation:					

Average of Averages _____ : _____

PROCEDURE

1. Set-up sampler as if to collect sample, including filled sample cartridge.
2. Set flow controller to achieve desired flowrate and record controller setting.
3. Observe and record Bubblemeter flow (on form or direct to floppy - Change File name).
4. Reset to zero. Then repeat step 3 two more times.
5. Calculate the average of 3 readings.
6. Repeat steps 1 thru 5 for each Rotameter.
7. Average of Averages and Deviation automatically calculated. Replace any Rotameters that deviate by 10% or more from the Average of Averages.
8. QA Section will get a copy for comparison with their results for the same setups.

APPENDIX II

LABORATORY REPORT

Air Resources Board

Alan C. Lloyd, Ph.D.
Chairman
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Winston H. Hickox
Agency Secretary

Gray Davis
Governor

MEMORANDUM

TO: Cindy Castronovo, Manager
Testing Section

FROM: Michael P. Spears, Manager
Evaluation Section
Monitoring and Laboratory Division

DATE: December 21, 1999

SUBJECT: AMITRAZ REPORT: DATE 16 DECEMBER 1999

I have attached the final Amitraz Report, we appreciate your comments on the draft report. I will be happy to make an electonic copy available to the Testing Section, if they desire to extract relevant portions of the report for use in their final report.

Please contact me at 322-8959 or Dr. T.E. Houston at 322-2365 if you have any questions.

CC: George Lew, Chief
Michael Poore

Attachment

California Environmental Protection Agency

Air Resources Board

Report on Amitraz Method Development and Amitraz Analytical Results for Ambient Monitoring and Application Samples

Principal Author
T.E. Houston, Ph.D.
Air Pollution Specialist, Evaluation Section

Reviewed and Approved by
Michael P. Spears, M.P.P.A.
Manager Evaluation Section
Engineering and Laboratory Branch
Monitoring and Laboratory Division

Project No. C98-007 and C98-008
December 16, 1999

1.0 Introduction

At the request of the Department of Pesticide Regulation (DPR), the Air Resources Board (ARB) developed an air sampling and analysis method for amitraz. The requested limit of quanitation from DPR was 2.4 ng/m^3. ARB staff collected and analyzed ambient and application air samples for amitraz. This report covers method development, analytical results, and quality assurance.

2.0 Method Development and Standard Operating Procedure.

2.1 Overview

ARB staff used gas chromatography/mass spectrometry (GC/MS) to achieve the low detection levels required by DPR with minimal interference. This low detection level required the use of large volume XAD cartridges and a corresponding large flow volume. Appendix 1 contains a complete description of the standard operating procedure (SOP). Due to the short time frame between the method development and the start of the ambient monitoring and application, not all the analytical issues were resolved before sampling began. Storage studies, field recoveries, extraction efficiencies, and breakthrough studies were all being run concurrent with the sampling.

2.2 Instrument Reproducibility

Five injections of 1 μl each was made of amitraz standards at 100, 400 and 800 ng/ml to establish the reproducibility of the instrument. The results are shown in Table 1.

2.3 Calibration

A five-point linear calibration (100-800 ng/ml) is made with each sample set run. A typical regression is: 100 ng/ml(540); 200 ng/ml(1012); 400 ng/ml(2557); 600 ng/ml(3943); 800 ng/ml(5702); r= 0.995.

2.4 Detection Limit

To establish the method detection limit (MDL) XAD resin was spiked at 100 ng/ml. Following U.S. EPA procedures, seven replicates of extracted resin were analyzed to determine the MDL. The MDL and the estimated quantitation limit (EQL) for amitraz are calculated as follows:

MDL=3.14(std dev of the replicates)

where std dev is the standard deviation of the value for the seven replicates. Given the std dev = 5.17 for the seven samples then:

MDL=3.14(5.17)=16.2 ng/ml
EQL=5*MDL, therefore 5(16.2 ng/ml)=81.2 ng/ml.

Based on the 1.0 ml extraction volume and assuming a sample volume of 43.2 m^3 (30 lpm for 24 hours) the EQL in terms of ambient concentration of amitraz is:

(81.2 ng/ml)(1.0 ml)/(43.2 m^3) = 1.9 ng/m^3 per 24-hour sample

Results are reported to 3 significant figures equal to or above the EQL. Results below EQL are reported as <100.

2.5 Collection and Extraction Efficiency (Recovery)

Recovery of amitraz was determined by spiking XAD cartridges with amitraz at 200 and 1000 ng/ml (4 at each concentration). Air is drawn through the spiked cartridges using field conditions (30 lpm for 24 hours). The preliminary results indicated a very low recovery percentage, 60-70% for the low end and less than 50% for the high end. This raised the question about whether or not there was loss of the sample on the field sampler. This analysis had been with 1.0 ml of the respective concentrations (spiking volume). Staff spiked additional cartridges using a spiking volume of 200 µl. The recoveries from this set of four (4) samples (low end spikes only) were 87.2, 90.8, 69.4, and 101.9, averaging 87.3%. All of the storage, field and trip spikes for the ambient and application studies used the original 1.0-ml spiking volume. All of the high-end spiked sample analyses, whether field, storage, or breakthrough showed very poor recovery. The focus is on the low-end recovery, which is within the required parameters of ± 20% and the expected range for application analysis.

2.6 Storage Stability

Storage stability studies ran concurrently with the analysis of the ambient and application samples. Each storage set consisted of three cartridges at 200 ng/ml, 3 at 1000 ng/ml and one XAD blank. The cartridges were stored in the freezer until analysis. Table 2 shows the results of the storage study. The average recovery for the low end is 84.5%, the high end recovery is low at 60.7%.

2.7 Breakthrough

To determine the sample breakthrough, two cartridges with blank back ups, were spiked with 2000 ng/ml of amitraz. Recovery of amitraz in the front cartridge was low, 41 and 61% respectively. Analysis of the back up cartridge detected no amitraz.

3.0 Ambient Sample Results

3.1 Ambient Samples

The lab received 157 ambient monitoring samples for analysis. In addition, three (3) trip blanks, four (4) trip spikes, four (4) field spikes, and four (4) laboratory spikes were analyzed concurrently. All of the spiked samples were 200 ng/ml. Ambient samples were analyzed in sets of 10 and included a solvent blank, standard check, an XAD blank, and an XAD spike (200ng/ml). Within eight weeks of receipt, all sample analysis was complete. Table 3 shows the analytical results. The samples were less than 100 ng/ml, the EQL, with the exception of sample # 135 (WES20) that indicated 100ng/ml.

3.2 Field Quality Assurance

Table 4 shows the laboratory, field, and trip spikes. These spikes used 1.0 ml of a 200-ng/ml solution. Recovery averaged 90.6% for the trip spikes, 79.8% for the field spikes, and 99.1% for the laboratory spikes. All of the trip blanks were <100 ng/ml.

3.3 Analytical Quality Assurance

Each set of 10 samples extracted and analyzed on the GC/MS included a standard check, an XAD blank, and an XAD spike at 200 ng/ml. The results of the check standards are contained in Table 5. The average concentration was 201.9 ng/ml. The XAD blank and spike were prepared as described for the samples. Each XAD spike used 200 µl of a 1000-ng/ml solution of amitraz. The average percent recovery of the XAD spikes was 98.5 and all the XAD blanks were <100 ng/ml. Table 6 shows the results. The actual recoveries under optimal conditions for analysis was $\pm$ 30%.

4.0 Application Sample Results

4.1 Application Samples

Collection of the application samples occurred over a 72-hour period, included were a trip blank, four (4) trip spikes and four (4) field spikes. Analysis of these samples occurred within 12 weeks of receipt. Table 7 lists the application samples. Sample E1#9 and the collocated sample E1D#10 indicate amitraz at concentration of 200 and 100 ng/ml respectively. Samples S1#11 and S5#31 were at the quantitation limit for analysis.

4.2 Quality Assurance

Table 8 shows the XAD blanks, spikes, and standard checks run for each sample set.

4.3 Field Spikes

Table 9 shows the recoveries for field spikes run before the application were on the high side. A re-calibration and re-analysis of the four samples produced results of 105.4, 119.0, 128.3, and 130.5 percent respectively.

4.4 Trip Spikes

Table 10 shows the recoveries for the trip blank and the trip spikes. The recovery averaged 82.2%.

5.0 Summary

The short time frame required between the method development and the start of the monitoring/application meant that some of the analytical questions were resolved concurrent with analysis. It was not certain what the recoveries would be since spikes sent to the field used the large volume concentration. The recoveries from the high-end spikes and the breakthrough are still questionable. The reason for the low recoveries is uncertain. However, high concentrations of the amitraz, even in the application were not expected.

The analytical method by GC/MS appears to be adequate but not optimal. There is some concern with possible interaction with the liner over time and some interaction on the column. The use of a different type of liner or a large volume injector system may resolve the issue.

The low detection limit required the use of the large volume XAD and high flow volume. This was pushing the capability of the analytical method. There was possible interference from the large volume extract as well as from the large flow rates, since some background was detected in the XAD blanks. An alternative sampling collection and extraction method maybe considered for future analysis.

Table 1: Instrument Reproducibility

Atrazine -$^{13}C_3$ amt. (ng/ml)	Atrazine-$^{13}C_3$ Response	Amitraz amt. (ng/ml)	Amitraz Response	Amt. Ratio	Response Ratio	Response Ratio RSD
500	6588	100	211	0.20	0.032	
500	6526	100	208	0.20	0.032	
500	6509	100	223	0.20	0.034	
500	6616	100	221	0.20	0.033	
500	6583	100	211	0.20	0.032	2.74
500	6352	400	1322	0.80	0.208	
500	6354	400	1270	0.80	0.200	
500	6271	400	1250	0.80	0.199	
500	6374	400	1293	0.80	0.203	
500	6364	400	1339	0.80	0.210	2.37
500	6316	800	2933	1.60	0.464	
500	6267	800	2865	1.60	0.457	
500	6245	800	2954	1.60	0.473	
500	6281	800	3054	1.60	0.486	
500	6360	800	3177	1.60	0.499	3.55

Table 2: Storage Studies

Date (Week)	200 ng/ml	%Recovery	1000 ng/ml	%Recovery
07/30/99 (2)	163.4	81.7	461.7	45.2
	140.7	70.4	519.7	51.9
	149.1	74.5	577.5	57.7
08/03/99 (3)	157.2	78.6	517.9	51.8
	162.9	81.4	413.1	41.3
	162.7	81.4	617.2	61.7
09/02/99 (7)	169.8	84.9	597.2	59.7
	119.7	59.8	633.6	63.3
	172.6	86.3	640.8	64.1
09/13/99 (9)	176.1	88.0	665.0	66.5
	176.5	88.2	689.0	68.9
	165.9	82.9	438.6	43.8
10/19/99 (14)	200.7	100.3	723.9	72.3
	220.2	110.1	807.0	80.7
	198.4	99.2	810.2	81.0

Table 3: Ambient Monitoring Sample Results

Date Received	Date Analyzed	Sample ID/ Log-in#	ng/sample (DPR)
07/27	09/16	WES1/#1	<100 (<MDL)
		HUR1/#2	<100(<MDL)
		SES1/#3	<100(<MDL)
		LHS1/#4	<100(<MDL)
		ARB1/#5	<100(<MDL)
		WES2/#6	<100(<MDL)
		HUR2/#7	<100(<MDL)
		SES2/#8	<100(<MDL)
		LHS2/#9	<100(<MDL)
		ARB2/#10	<100(<MDL)
	09/20	WES3/#11	<100(<MDL)
		WES3D/#12	<100(<MDL)
		HUR3/#13	<100(<MDL)
		HUR3D/#14	<100(<MDL)
		SES3/#15	<100(<MDL)
		SES3D/#16	<100(<MDL)
		LHS3/#17	<100(<MDL)
		LHS3D/#18	<100(<MDL)
		ARB3/#19	<100(<MDL)
		ARB3D/#20	<100(<MDL)
	09/22	WES4/#21	<100(<MDL)
		HUR4/#22	<100(<MDL)
		SES4/#23	<100(<MDL)
		LHS4/#24	<100(<MDL)
		ARB4/#25	<100(<MDL)
08/03		WES5/#26	<100(<MDL)
		HUR5/#27	<100(<MDL)
		SES5/#28	<100(<MDL)
		LHS5/#29	<100(<MDL)
		ARB5/#30	<100(<MDL)
	09/23	WES6/#31	<100(<MDL)
		WES6D/#32	<100(<MDL)
		HUR6/#33	<100(<MDL)
		HUR6D/#34	<100(<MDL)
		SES6/#35	<100(<MDL)
		SES6D/#36	<100(<MDL)

Table 3: Ambient Monitoring Sample Results

Date Received	Date Analyzed	Sample ID/ Log-in #	ng/sample (DPR)
08/03	09/23	LHS6/#37	<100(<MDL)
		LHS6D/#38	<100(<MDL)
		ARB6/#39	<100(<MDL)
		ARB6D/#40	<100(<MDL)
	09/28	WES7/#41	<100(<MDL)
		HUR7/#42	<100(<MDL)
		SES7/#43	<100(<MDL)
		LHS7/#44	<100(<MDL)
		ARB7/#45	<100(<MDL)
08/09		WES8/#46	<100(<MDL)
		HUR8/#47	<100(<MDL)
		SES8/#49	<100(<MDL)
		ARB8/#50	<100(<MDL)
	09/29	WES9/#52	<100(<MDL)
		HUR9/#53	<100(<MDL)
		SES9/#54	<100(<MDL)
		LHS9/#55	<100(<MDL)
		ARB9/#56	<100(<MDL)
		WES10/#57	<100(<MDL)
		WES10D/#58	<100(<MDL)
		HUR10/#59	<100(<MDL)
		HUR10D/#60	<100(<MDL)
	09/30	SES10/#61	<100(<MDL)
		SES10D/#62	<100(<MDL)
		LHS10/#63	<100(<MDL)
		LHS10D/#64	<100(<MDL)
		ARB10/#65	<100(<MDL)
		ARB10D/#66	<100(<MDL)
		WES11/#67	<100(<MDL)
		HUR11/#68	<100(<MDL)
		SES11/#69	<100(<MDL)
		LHS11/#70	<100(<MDL)
	10/05	ARB11/#71	<100(<MDL)
08/23		HEL12/#72	<100(<MDL)
		WES12/#73	<100(<MDL)
		HUR12/#74	<100(<MDL)
		LHS12/#75	<100(<MDL)
		SES12/#76	<100(<MDL)
		ARB12/#77	<100(<MDL)

Table 3: Ambient Monitoring Sample Results

Date Received	Date Analyzed	Sample ID/ Log-in #	ng/sample (DPR)
08/23	10/05	HEL13/#79	<100(<MDL)
		HEL13D/#80	<100(<MDL)
	10/06	WES13/#81	<100(<MDL)
		HUR13/#83	<100(<MDL)
		HUR13D/#84	<100(<MDL)
		LHS13/#85	<100(<MDL)
		LHS13D/#86	<100(<MDL)
		SES13/#87	<100(<MDL)
		SES13D/#88	<100(<MDL)
		ARB13/#89	<100(<MDL)
		ARB13D/#90	<100(<MDL)
	10/07	HEL14/#91	<100(<MDL)
		HUR14/#92	<100(<MDL)
		LHS14/#93	<100(<MDL)
		SES14#94	<100(<MDL)
		ARB14/#95	<100(<MDL)
		WES14/#96	Det
		HEL15/#97	<100(<MDL)
		WES15/#98	<100(<MDL)
		HUR15/#99	<100(<MDL)
		LHS15/#100	<100(<MDL)
08/23	10/18	SES15/#101	<100(<MDL)
		ARB15/#102	<100(<MDL)
		HEL16/#103	<100(<MDL)
		WES16/#104	<100(<MDL)
		HUR16/#105	<100(<MDL)
		SES16/#106	<100(<MDL)
		LHS16/#107	<100(<MDL)
		ARB16/#108	<100(<MDL)
		HEL17/#109	<100(<MDL)
		HEL17D/#110	<100(<MDL)
		WES17/#111	<100(<MDL)
		WES17D/#112	<100(<MDL)
		SES17/#115	<100(<MDL)
		SES17D/#116	<100(<MDL)
		LHS17/#117	<100(<MDL)
		LHS17D/#118	<100(<MDL)
		ARB17/#119	<100(<MDL)
		ARB17D/#120	<100(<MDL)

Table 3: Ambient Monitoring Sample Results

Date Received	Date Analyzed	Sample ID/ Log-in #	ng/sample (DPR)
08/23	10/21	HEL18/#121	<100(<MDL)
		WES18/#122	<100(<MDL)
		HUR18/#123	<100(<MDL)
		HUR18D/#124	<100(<MDL)
		SES18/#125	<100(<MDL)
		LHS18/#126	<100(<MDL)
		ARB18/#127	<100(<MDL)
		HEL18/#128	<100(<MDL)
		WES19/#129	<100(<MDL)
		HUR19/#130	<100(<MDL)
	10/25	LHS19/#131	<100(<MDL)
		SES19/#132	<100(<MDL)
		ARB19/#133	<100(<MDL)
08/28		HEL20/#134	<100(<MDL)
		WES20/#135	Det
		HUR20/#136	<100(<MDL)
		SES20/#137	<100(<MDL)
		LHS20/#138	<100(<MDL)
		ARB20/#139	<100(<MDL)
	10/26	HEL21/#141	<100(<MDL)
		HEL21D/#142	<100(<MDL)
		WES21/#143	<100(<MDL)
		WES21D/#144	<100(<MDL)
		HUR21/#145	<100(<MDL)
		HUR21D/#146	<100(<MDL)
		SES21/#147	<100(<MDL)
		SES21D/#148	<100(<MDL)
		LHS21/#149	<100(<MDL)
		LHS21D/#150	<100(<MDL)
	10/27	ARB21/#151	<100(<MDL)
		ARB21D/#152	<100(<MDL)
		HEL22/#153	<100(<MDL)
		WES22/#154	<100(<MDL)
		HUR22/#155	<100(<MDL)
		SES22/#156	<100(<MDL)
		LHS22/#157	<100(<MDL)
		ARB22/#158	<100(<MDL)
	10/28	HEL23/#161	<100(<MDL)
		WES23/#162	<100(<MDL)

Table 3: Ambient Monitoring Sample Results

Date Received	Date Analyzed	Sample ID/ Log-in #	ng/sample (DPR)
08/28	10/28	HUR23/#163	<100(<MDL)
		LHS23/#165	<100(<MDL)

Table 4: Laboratory, Field, and Trip Spikes

Trip Spikes

Date Analyzed	Sample ID	ng/ml	%Recovery
10/27	PTS813-1	210.0	105.0
10/28	PTS813-2	142.8	71.4
	PTS813-3	190.3	95.2
	PTS813-4	182.2	91.1

Field Spikes

Date Analyzed	Sample ID	ng/ml	%Recovery
10/27	PFS813-1	241.5	120.8
	PFS813-2	**	
10/28	PFS813-3	185.6	92.8
	PFS813-4	212.0	106.0

** Sample lost on extraction.

Laboratory Spikes

Date Analyzed	Sample ID	ng/ml	%Recovery
09/30	PLS813-1	147.5	73.8
10/06	PLS813-2	192.8	96.4
10/18	PLS813-3	233.3	116.7
10/26	PLS813-4	219.5	109.7

Trip Blanks

Date Analyzed	Sample ID	ng/ml
09/29	TB#1	<100
10/05	TB#2	<100
10/25	TB#3	<100

Table 5: QC Check Standards for ambient monitoring samples

Date Analyzed	ng/ml	%Recovery
09/16	179.4	89.7
09/20	154.6	77.3
09/22	226.5	113.3
09/23	232.8	116.4
09/28	149.6	74.8
09/29	268.3	134.2
09/30	232.1	116.0
10/05	213.4	106.7
10/06	228.0	114.0
10/07	175.3	87.7
10/18	176.9	88.5
10/19	208.9	104.5
10/21	227.5	113.8
10/25	153.1	76.6
10/26	185.7	92.9
10/27	193.9	97.0
10/28	226.4	113.2

Table 6: QC XAD Control Spikes and Blanks

Date Analyzed	ng/ml	%Recovery	XAD Blanks
09/16	177.5	88.8	<100
09/20	184.9	92.5	<100
09/22	175.8	87.9	<100
09/23	174.5	87.3	<100
09/28	154.9	77.5	<100
09/29	211.1	105.5	<100
09/30	194.7	97.4	<100
10/05	204.4	102.2	<100
10/06	205.4	102.7	<100
10/07	176.4	88.2	<100
10/18	249.5	124.8	<100
10/19	223.6	111.8	<100
10/21	213.6	106.8	<100
10/25	194.5	97.3	<100
10/26	203.0	101.5	<100
10/27	221.8	110.9	<100
10/28	186.3	91.7	<100

Table 7: Application Samples

Date Sampled	Date Analyzed	Sample ID/ Log-in #	ng/sample (DPR)
08/06	11/02	NB/#1	<100(<MDL)
		WB/#3	<100(<MDL)
		SB/#5	<100(<MDL)
		EB/#7	<100(<MDL)
		E1/#9	231
		E1D/#10	125
08/07	11/03	S1/#11	<100(<MDL)
		W1/#12	<100(<MDL)
		N1/#13	<100(<MDL)
		E2/#14	<100(<MDL)
		E2D/#15	<100(<MDL)
		S2#16	<100(<MDL)
		W2/#17	<100(<MDL)
		N2/#18	<100(<MDL)
		E3/#19	<100(<MDL)
		E3D/#20	<100(<MDL)
	11/05	S3/#21	<100(<MDL)
		W3/#22	<100(<MDL)
		N3/#23	<100(<MDL)
		E4/#24	<100(<MDL)
		E4D/#25	<100(<MDL)
		S4/#26	<100(<MDL)
		W4/#27	<100(<MDL)
		N4/#28	<100(<MDL)
08/08		E5/#29	<100(<MDL)
		E5D/#30	<100(<MDL)
	11/08	S5/#31	Det

TABLE 8: Quality Assurance Samples

XAD Spikes and Blanks

Date Analyzed	ng/ml	%Recovery	Blanks
11/02	262.2	131.1	<100
11/03	232.7	116.4	<100
11/05	204.7	102.3	<100
11/08	209.98	105.0	<100

QC Checks

Date Analyzed	ng/ml	%Recovery
11/02	202.9	101.5
11/03	200.1	100.1
11/05	186.0	93.0
11/08	213.2	106.6

TABLE 9: Field Spikes

Field Spikes

Date Analyzed	Sample ID/ Log-in #	ng/ml	%Recovery
11/02	NFS1/#2	248.5	124.3
	WFS2/#4	293.7	146.9
	SFS3/#6	248.0	124.0
	EFS4/#8	244.4	122.2

TABLE 10: Trip Spikes

Trip Spikes and Blank

Date Analyzed	Sample ID/ Log-in #	ng/ml	%Recovery
11/08	TB#34	<100	NA
	TS1#35	163.8	81.9
	TS2#36	167.7	83.8
	TS3#37	158.1	79.0
	TS4#38	168.2	84.1

APPENDIX 1

Standard Operating Procedure for Amitraz

California Environmental Protection Agency

Air Resources Board

Evaluation Section
Engineering and Laboratory Branch
Monitoring and Laboratory Division

Standard Operating Procedure
Sampling and Analysis of Amitraz in Ambient Air

7/12/99 version

Approved:

1. SCOPE

This is a gas chromatographic/mass spectrometric method for the determination of amitraz from ambient air sampling using large volume capacity teflon cartridges with XAD-2 resin.

2. SUMMARY OF METHOD

The method uses atrazine-$^{13}C_3$ at 500 ng/ml in hexane as an internal standard. The exposed XAD-2 resin (Supelpak-2B) cartridges are stored on dry ice in an ice chest or in a freezer until ready for analysis. The XAD is extracted with ethyl acetate in an Erlenmeyer flask using a shaker. The extraction solvent is filtered and evaporated in a TurboVap to dryness. Dissolve the extract in 1.0 ml of hexane with internal standard. The splitless injection volume is 1 µl. A gas chromatograph with a capillary column (95% methyl 5% phenyl silicone stationary phase) and a quadrapole mass spectrometer (MS) is used for analysis. The MS detector is operated in selective ion monitoring mode.

3. INTERFERENCES/LIMITATIONS

A method blank is run with each batch of samples to detect any possible method interference. Contaminants in solvents, reagents, glassware and other processing apparatus may cause interference including discrete artifacts or elevated baselines. Co-eluting compounds trapped during sample collection may also interfere.

4. EQUIPMENT AND CONDITIONS

A. Instrumentation

Hewlett Packard 5890 Series II chromatograph
Hewlett Packard 5972 mass selective detector
Hewlett Packard 7673 Autosampler

Detector: 280°C
Injector: 220°C
Injector Liner: 4 mm straight liner
Column: HP HP-5MS or J&W DB-5MS, 30 meter, 0.25 mm i.d., 0.25 um film thickness.

GC Temp. Program: Initial 50°C, hold 5 min., to 280°C @ 10°C/min, hold 6.0 min.

Injector:

Pressure Initial 8.8 psi constant flow mode
Splitless: Purge on 2.0 min.
Carrier Gas: Helium
Column: Linear velocity: 38 cm/sec, electronic pressure control (8.8 psi @ 50 °C).

Auto Sampler:

Sample washes - 2, Sample pumps - 2, Sample Volume - 1 stops, Viscosity delay - 1 sec, Solvent A washes - 2, Solvent B washes - 2

Mass Spectrometer:

Electron Ionization
Selective Ion Monitoring; Amitraz - 293 (quant. ion, 100%), 147 (qual. ion, 20%), 167 (qual. ion, 20%). atrazine-$^{13}C_3$ - 218 (quant. ion, 100%), 203 (qual. ion, 20%), 176 (qual. ion. 20%). Tuning: PFTBA on masses 69, 219, 502.

B. Auxiliary Apparatus

1. Erlenmeyer flasks, 250 ml capacity with caps
2. Glass funnel
3. Whatman ,high purity quartz microfibre filters
4. Zymark TurboVap II Concentrator (Hopkinton, Mass.)
5. 250 ml capacity shaker
6. GC autosampler vials with septum caps.

C. Reagents

1. Hexane, Pesticide Grade or better
2. Ethyl Acetate, Pesticide Grade or better
3. Amitraz, 98% pure or better (from Chem Service, West Chester, Penn).
4. Atrazine-$^{13}C_3$ 99% pure or better (from Cambridge Isotope Laboratories, Andover, MA)
5. XAD Resin, Supelpak-2B #1-3670 (from Supelco, Bellefonte, PA)

5. ANALYSIS OF SAMPLES

1. A daily manual tune shall be performed using PFTBA. The instrument is tuned using masses - 69, 219, 502. The criterion for the tune are the peak widths at 1/2 the peak height, 0.50 $\pm$ .05, and the criteria for relative

abundance; 69:100%; 219:100%-120%, and 502:7%-12%.

2. It is necessary to analyze a solvent blank with each batch of samples. The blank must be free of interferences. A solvent blank must be analyzed after any sample results in possible carry-over contamination.

3. A 5- point calibration curve shall be analyzed with each batch of samples.

4. With each batch of samples analyzed a laboratory blank and a laboratory control spike will be run concurrently. A laboratory blank is resin prepared and analyzed the same way the samples are analyzed. A laboratory control spike is resin spiked with a known amount of standard. The control sample is prepared and analyzed the same way as the samples. Laboratory check samples need to be within 40% (100*difference/average) of each other and have recoveries that are +/-30% of the theoretical spiked value.

5. Run a 200 ng/ml calibration check sample for each set of 10 samples. The response of the standard must be within 20% of the initial calibration analyses for the batch. If the calibration check is outside the limit then those samples in the batch after the last calibration check that was within the 20% limit need to be reanalyzed.

6. Using a glass funnel, transfer the XAD resin from the teflon cartridge into a 250-ml Erlenmeyer flask. Rinse the teflon plug and screening with 100 ml of the extraction solvent (ethyl acetate). Place the flask on a shaker for 1 hour.

7. Filter the extraction solvent using quartz filters to remove the XAD. Transfer the solvent into clean 250-ml flask and cap.

8. Transfer the solvent extract into a Zymark evaporating tube. The extract is evaporated at 45° C to dryness under a gentle nitrogen stream (5-6 psi). The extract is dissolved in 1.0 ml of n-hexane containing 500 ng/mL of atrazine-$^{13}C_3$. Transfer an aliquot to a GC autosample vial.

9. Use the data system calibration response factors to calculate the concentration in ng/ml. If the sample has been diluted, multiply the calculated concentration by the dilution factor.

10. The atmospheric concentration is calculated according to:

Conc., ng/m^3 = (Extract Conc., ng/ml X 1.0 ml) /Air Volume Sampled, m^3

6. QUALITY ASSURANCE

A. Instrument Reproducibility

Establish the reproducibility of the instrument and analytical method as follows. Inject five 1 µl injections of amitraz standard at three concentrations (low, mid and high range).

B. Calibration

Perform a multi-point calibration to determine the best fit for the method quantitation.

C. Calibration Check

A calibration check sample is run after the calibration and then every tenth sample in a batch to verify the system is still in calibration. Calibration check samples must be within 20% of the assigned value. If the check sample is outside that range then the ten samples within that sample batch will be rerun.

D. Minimum Detection Limit

Detection Limit is based on US EPA MDL calculation. Using the analysis of seven replicates of a low-level matrix spikes, the method detection limit (MDL), and the estimated quantitation limit (EQL) for amitraz is calculated by:

MDL = 3.14*(stdev of values)
EQL = 5*MDL
where:
stdev = the standard deviation of the response calculated for the seven replicate spikes.

Results are reported to 3 significant figures above the EQL. Results below EQL are reported as <100 ng/ml.

E. Collection and Extraction Efficiency (Recovery)

Amitraz at low level and high level are spiked on XAD cartridges (4 at each concentration). The spiked cartridges are placed on field samplers with airflows of 30 lpm for 24 hours. The samples are extracted with ethyl acetate and prepared as described in section 5 #6-8. The average percent recoveries of Amitraz should be $\pm$ 20% of the expected value.

F. Storage Stability

Conduct a storage stability study of amitraz over a 6-week period. The cartridges are spiked with amitraz at low level and high level at three each plus a blank for each week of the analysis. The spiked cartridges are stored in the freezer at -20^{0}C and extracted/analyzed on storage weeks 0, 2, 4 and 6.

G. Breakthrough

Two cartridges are spiked with amitraz at a high level. Piggy-backed to the spiked cartridge is a resin blank. The cartridges are placed on the sampler for 24 hours at 30 lpm . Each cartridge is then extracted/analyzed for amitraz to determine if the amitraz is going through into the second cartridge.

H. Safety

This procedure does not address all of the safety concerns associated with chemical analysis. It is the responsibility of the analyst to establish appropriate safety and health practices. For hazard information and guidance refer to the material safety data sheets (MSDS) of any chemicals used in this procedure.

APPENDIX III

PESTICIDE USE REPORT

M Triple Field Rec.

PESTICIDE USE RECOMMENDATION
HELM FERTILIZERS, INC
P.O. Box 125
Helm, Ca 93627
209-866-5667

 # 2779
Date: 08-04-99
Proposed: 08-06-99
Expires: - -
Completed: - -

Crop: COTTON
Area: 211 Acres
Del Tkt#:
PO#: 32360
PCA: Don Clark 7655
Pest. Permit#: 10-99-10-30196

Grower: D.G.F. PARTNERSHIP
P.O. BOX 128
TRANQUILLITY, CA 93668
693-4352
Acct#:
Applr: R & B HELICOPTERS, INC.
Fldmn: Don Clark 7655

Field	Site		County	Section	Township	Range	B&M	Treatment Area
1-3	3703	NW LASSEN & MT VIEW	CA10	10-	16S -	17E -		35 Acres
1-4,5	3745	NEQ	CA10	15-	16S -	17E -		120 Acres
1-101	3101	SEQ	CA10	15-	16S -	17E -		56 Acres

##

Recommendation#: 2779 Proposed Treatment: 211 Acres

Material	REG.#	RATE	/100 gal	Band	Mat. Req.	Target Pest	
VYDATE C-LV	00352-00532-AA-00000	10.00 ozs /Treated Ac	300.00	No	49.45 gal	LYGUS	M*
CVASYN	45639-00166-AA-00000	2.00 pts /Treated Ac	20.00	No	52.75 gal	BOLLWORM (EGGS)	M*
KNA BU PH ER	1050990-50015-AA-000	2.00 pts / 100 Gal.	2.00	No	5.28 gal	*EXEMPT*	M*
KNA SPREADER-STNDER	1050990-50006-AA-000	1.00 pts / 100 Gal.	1.00	No	2.64 gal	*EXEMPT*	M*

Apply by: AIR Gallons of Diluent/Treated Acre: 10

SPECIAL INSTRUCTIONS

CVASYN: DO NOT APPLY AFTER BOLLS ARE OPEN. DO NOT APPLY BY ULV.
BU-PH-ER:NOT COMPATIBLE W/HIGH pH PRODUCTS/PHENOXY HERB. BUFFERED LOWER THAN 4.5

Growth Stage(s): FIELD/VEGETABLE CROP

########################## PRECAUTIONS ##########################

Restricted: YES, CERTIFIED APPLR ONLY
Chemical Category: I DANGER
Closed Mixing System Required

Days to Harvest: 14
Avoid Drift
Avoid Water Contamination
Toxic to Bees *
Toxic to Fish
Toxic to Birds

Non Re-entry Interval: 48.00 HOURS
Feed/Graze Treated Area/Crop: NO
Plantback Restriction: YES
*NOTIFY BEEKEEPERS AT LEAST 48 HRS BEFORE APPLICATIO

CRITERIA / ENVIRONMENTAL CHARGES
1. PESTS AT ECONOMIC LEVELS 2. PEST PRESENT. 3. FIELD OBSER VATION.

The execution of this recommendation certifies that alternative and mitigation measures that would substantially lessen any significant adverse impact on the environment have been considered and, if feasible, adopted.

NW	N	NE
COTTON	COTTON	COTTON
W	Target	HELM E
COTTON	1-101	SCHOOL
SEED	SEED	SEED
SW	S	SE

Don Clark 7655 Signature:

Grower Signature:

1-101 **«READ THE LABEL»**

*** RECOMMENDATION CONTINUED ON NEXT PAGE ***

COPY

eta Test 1999 PESTICIDE USE REPORT ENTRY/EDIT SCREEN 2.3b Enhanced RT
Production Agriculture Updated 11-19-99

DCNUM: 9119 GROWER #: 1030196 GROWER: D G F PARTNERSHIP

TF TD # 3101 PLANTED TOTAL 56.0 A S.15 T.16 R.17 MAP-ID 01
MMODITY COTTON SITE LOCATION NW COR LASSEN/KAN

PPLICATOR R & B HELICOPTERS App-Type P

App Date	Time	M	Tr	Area	U	EPA Reg. Number	Amt Used	Un
08/05/99	30	A		56.00	A	352- 532-AA- 352	13.13	GA
08/05/99	30	A		56.00	A	45639- 146-AA 45639	14.00	GA
08/06/99	30	A		56.00	A	1050990-50015-AA-1050990	2.80	GA
08/06/99	30	A		56.00	A	1050990-50006-AA-1050990	0.70	GA

d. DUPONT VYDATE C-LV INSECTICIDE Chem. Mfg. E.I. DU PONT DE NEMOURS & CO.

^S=Save - ^D=Delete - TAB=Find - ^Q=HELP - ^A=Clear Screen - ESC=Quit G

APPENDIX IV

DPR's
AIR MONITORING RECOMMEDATIONS FOR AMITRAZ

State of California

Memorandum

To: George Lew, Chief
Engineering and Laboratory Branch
Monitoring and Laboratory Division
Air Resources Board
600 North Market Boulevard
Sacramento, California 95812

Date: August 1, 1997

From: **Department of Pesticide Regulation** - 1020 N Street, Room 161
Sacramento, California 95814-5624

Subject: AIR MONITORING RECOMMENDATION FOR AMITRAZ

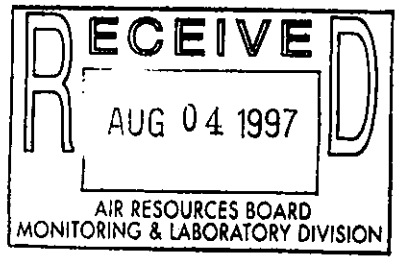
Attached is the Department of Pesticide Regulation's (DPR) recommendation for monitoring the pesticide amitraz. DPR provides this recommendation pursuant to the requirements of Assembly Bill 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5). DPR bases its air monitoring recommendations on historical amitraz use information. Therefore, we request you consult with the agricultural commissioner in the county where air monitoring will be conducted to select appropriate sites.

We anticipate submission of air monitoring data by February 1999.

If you have any questions please contact Pam Wales, of my staff, at (916) 322-3877.

John S. Sanders

John S. Sanders, Ph.D., Chief
Environmental Monitoring and
Pest Management Branch
(916) 324-4100



Attachment

SURNAME

cc: Pam Wales, DPR (w/attachment)
Madeline Brattesani, DPR (w/attachment)
Charles M. Andrews, DPR (w/attachment)
Barry Cortez, DPR (w/attachment)
John Donahue, DPR (w/attachment)
Gary Patterson, DPR (w/attachment)
Lynn Baker, ARB (w/attachment)
Cindy Castronovo, ARB (w/attachment)
Raymond Menebroker, ARB (w/attachment)
Kevin Mongar, ARB (w/attachment)
Dennis Bray, Agricultural Commissioner Kings County (w/attachment)
Dennis Pooler, Agricultural Commissioner Yuba County (w/attachment)

California Department of Pesticide Regulation
Environmental Monitoring and Pest Management Branch

Staff Report

USE INFORMATION AND AIR MONITORING RECOMMENDATION FOR THE PESTICIDE ACTIVE INGREDIENT AMITRAZ

July 1997

Principal Author
Pamela Wales
Environmental Research Scientist

Graphics by
Craig Nordmark
Environmental Research Scientist

State of California
Department of Pesticide Regulation
1020 N Street
Sacramento, California 95814-5624

USE INFORMATION AND AIR MONITORING RECOMMENDATION FOR THE PESTICIDE ACTIVE INGREDIENT AMITRAZ

A. BACKGROUND

This recommendation contains general information regarding the physical-chemical properties and the historical uses of the pesticide *N'*-(2,4-dimethylphenyl)-*N*-[[(2,4-dimethylphenyl)imino] methyl]-*N*-methylmethanimidamide (amitraz). The Department of Pesticide Regulation (DPR) provides this information to assist the Air Resources Board (ARB) in their selection of appropriate locations for conducting pesticide air monitoring operations.

Amitraz (CAS: 33089-61-1) exists as colorless, odorless monoclinic needles. Amitraz has a molecular formula of $C_{19}H_{23}N_3$, and a molecular weight of 293.4 g/mole. It is soluble in water at room temperature, ca. 1 mg/L. It has a Henry's Constant of 1.48×10^{-7} atm·m³/mol at 20–25 °C, and a vapor pressure of 0.051 mPa at 20 °C. Amitraz is soluble in most organic solvents; it's solubility >300 g/L in acetone, toluene, and xylene.

Amitraz is stable to heat. The reported half-life in buffered aqueous solution (pH 7) is about 6 hours at 20°C. Ultraviolet light appears to have little effect on stability. In soil, amitraz decomposes rapidly under aerobic conditions; its half-life in soil < 1 day. Degradation occurs more rapidly in acid than in neutral or alkaline soils.

Amitraz's acute oral LD_{50} is 800 mg/kg for rats, and >1600 mg/kg for mice. Its acute inhalation LC_{50} (6 hours) for rats is 65 mg/L air. Its LC_{50} (96 hour) is 2.7-4.0 mg/L for rainbow trout, and 1.3 mg/L for bluegill sunfish. It exhibits a low toxicity to bees and other predatory insects. Amitraz entered the risk assessment process at DPR under SB 950 (Birth Defect Prevention Act of 1984) based on potential oncogenicity, reproductive and mutagenicity effects.

B. USE OF AMITRAZ

As of July 1, 1997, nine amitraz-containing products were registered for use in California. Three products are registered specifically for use on pears, two products are registered for use solely on cotton, and the remainder include tick collars for dogs, and livestock and livestock premises sprays. Amitraz is a nonsystemic diamidide insecticide and miticide with contact and respiratory action. Additionally, amitraz acts as a synergist for other cotton insecticides.

With DPR's implementation of full pesticide use reporting in 1990, all users must report the agricultural use of any pesticide to their county agricultural commissioners, who subsequently forward this information to DPR. DPR compiles and publishes the use information in the annual Pesticide Use Report (PUR). Because of California's broad definition for agricultural use, DPR includes data from pesticide applications to parks, golf courses, cemeteries, rangeland, pastures, and rights-of-way, postharvest applications of pesticides to agricultural commodities, and all pesticides used in poultry and fish production, and some livestock applications in the PUR. DPR does not collect use information for home and garden use, most livestock use, or for most industrial and institutional uses. The information included in this monitoring recommendation reflects cropland applications of amitraz. Use rates were calculated by dividing the total pounds of amitraz reported used (where amitraz was applied to acreage) by the total number of acres reported treated.

Prior to 1994, field amitraz applications were limited largely to pears. In 1994, the two cotton-specific products became available. The use patterns reflect this change—the total 1990-1993 use averaged 6,000 lbs AI per year, while 1994 and 1995 total use increased to an average 74,000 lbs AI per year. Applications to cotton in four counties accounts for nearly all of the increase. According to the PUR, over 99 percent of California's total 1994 and 1995 amitraz use occurs in ten counties (Table 1). Historically, cropland applications account for over 99 percent of the total amount of amitraz reported used each year. According to the PUR, non-cropland applications—livestock premise and livestock sprays—account for less than one percent of the total amount of amitraz reported used each year. However, most livestock uses are not required to be reported in the PUR.

In California, growers use amitraz to control pear psylla in pears, and several insects in cotton including aphids, spider mites, and whiteflies, depending on location. In the San Joaquin Valley, aphids and mites represent the primary target pest; in Imperial Valley silverleaf whitefly is the most serious pest. Labeled use rates for amitraz range from 0.75 to 1.5 pounds active ingredient (AI) per acre in pears, and from 0.125 to 1 lb AI per acre in cotton. The highest label rates in pears are associated with pear psylla, while the highest label rates in cotton are associated with moderate to severe infestations of spider mites. Amitraz is formulated as either a wettable powder or an emusifiable concentrate. Amitraz-containing products include the Signal Word "Warning" or "Danger" on their labels, depending on the formulation or concentration of the product.

Table 1. Annual Agricultural Use of Amitraz (Pounds of Active Ingredient)

COUNTY	1995	1994	1993
Kings	23,594	25,967	0
Tulare	16,985	18,719	18
Kern	15,204	9,824	0
Fresno	12,869	11,824	78
Merced	2,586	508	0
Yuba	2,526	978	2,688
Madera	846	744	0
Lake	673	98	187
Mendocino	552	545	992
Imperial	488	1,172	0
County Totals	76,323	70,379	3,963
Percent of Total	***99%***	***99%***	***81%***
CALIFORNIA TOTAL	**77,198**	**71,153**	**4,877**

According to the PUR, beginning in 1994, Kings County and Tulare County routinely receive the greatest applications of amitraz; where growers apply nearly 35 and 24 percent of all the amitraz used, respectively. Table 2 summarizes the total amounts and average daily rates of amitraz reported applied in Kings and Tulare Counties during the months of greatest use in 1994 and 1995. Prior to 1994, the highest amitraz use occurred in Yuba County, where approximately 1,500 lbs AI were applied during June each year.

Table 2. Amitraz Applications in Kings and Tulare Counties

COUNTY		1995		1994	
	MONTH	*Lbs Used*[1]	*Rate*[2]	*Lbs Used*[1]	*Rate*[2]
Kings County					
	August	13,568	0.5	19,879	0.6
	July	9,218	0.4	5,882	0.5
Tulare County					
	August	14,071	0.4	13,462	0.5
	July	2,722	0.4	5,124	0.6

[1] In pounds of active ingredient.
[2] Average rate (in pounds of active ingredient per acre).

In Kings County, the highest use occurs in August, and is associated with applications to cotton. Generally, growers apply amitraz during the middle to late part of the growing season, when severe aphid infestations can lead to significant losses in the yield or the quality of the cotton.

The highest reported rates of amitraz use occur at about 1.5 lbs AI per acre (the highest labeled rate), and are associated with summer applications to pears, primarily in Yuba County.

C. RECOMMENDATIONS

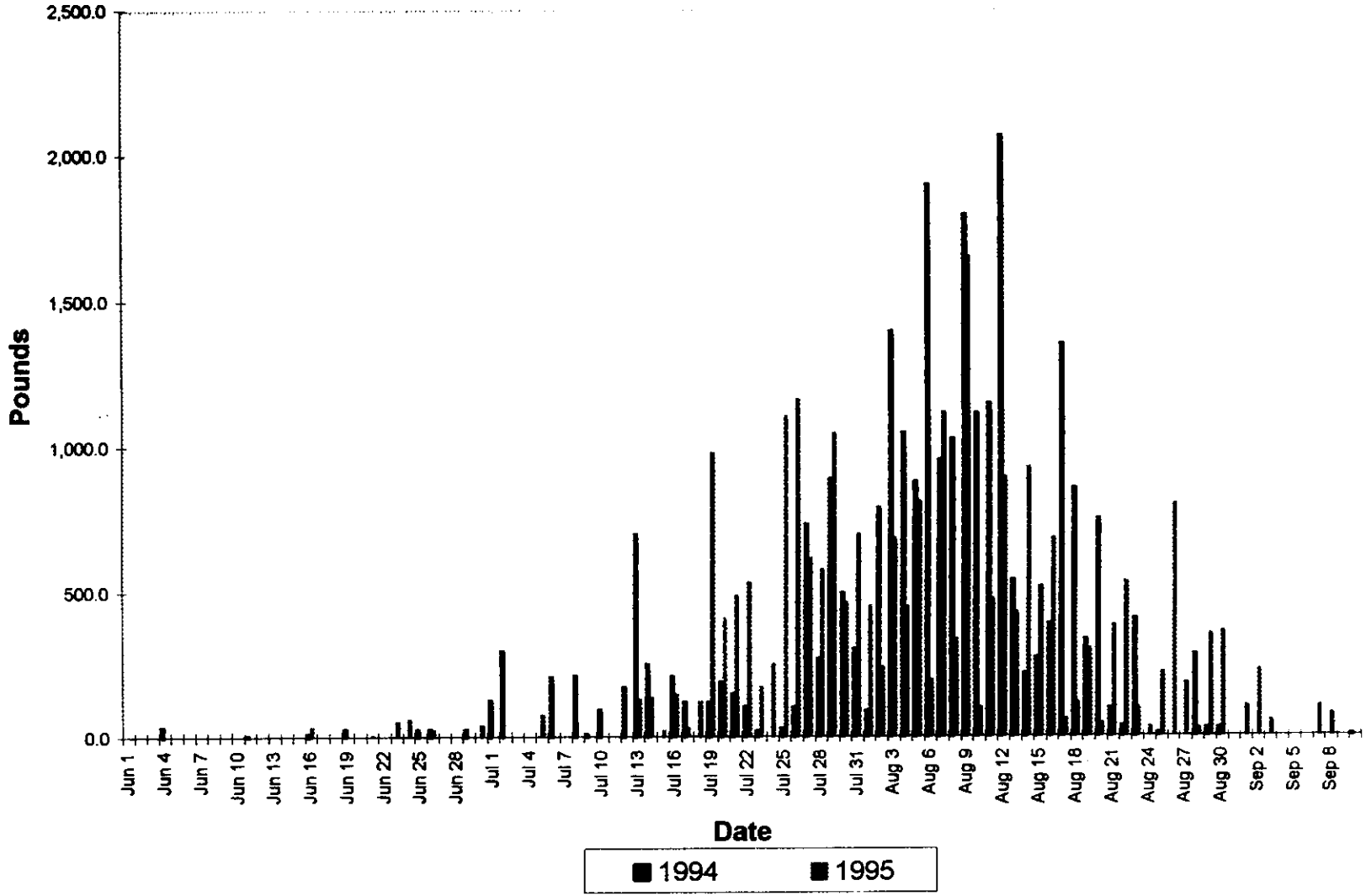
1. Ambient Air Monitoring

The historical trends in amitraz use suggest that monitoring should occur over a 30- to 45-day sampling period in the cotton growing regions in northern Kings County from mid-July through August. Figure 1 shows applications routinely begin in mid-July, reach a peak during the first week in August, then tail off throughout the remainder of the month. Figure 2 displays the areas of amitraz use by section in Kings County for 1994-1995. Amitraz was not registered for use on cotton prior to 1994. Amitraz is generally applied when aphid populations become high. Because amitraz is a contact insecticide, followup applications may be needed as aphid populations resurge. These multiple applications account for the excessive number of acres (i.e. >640 acres) reported treated for some sections.

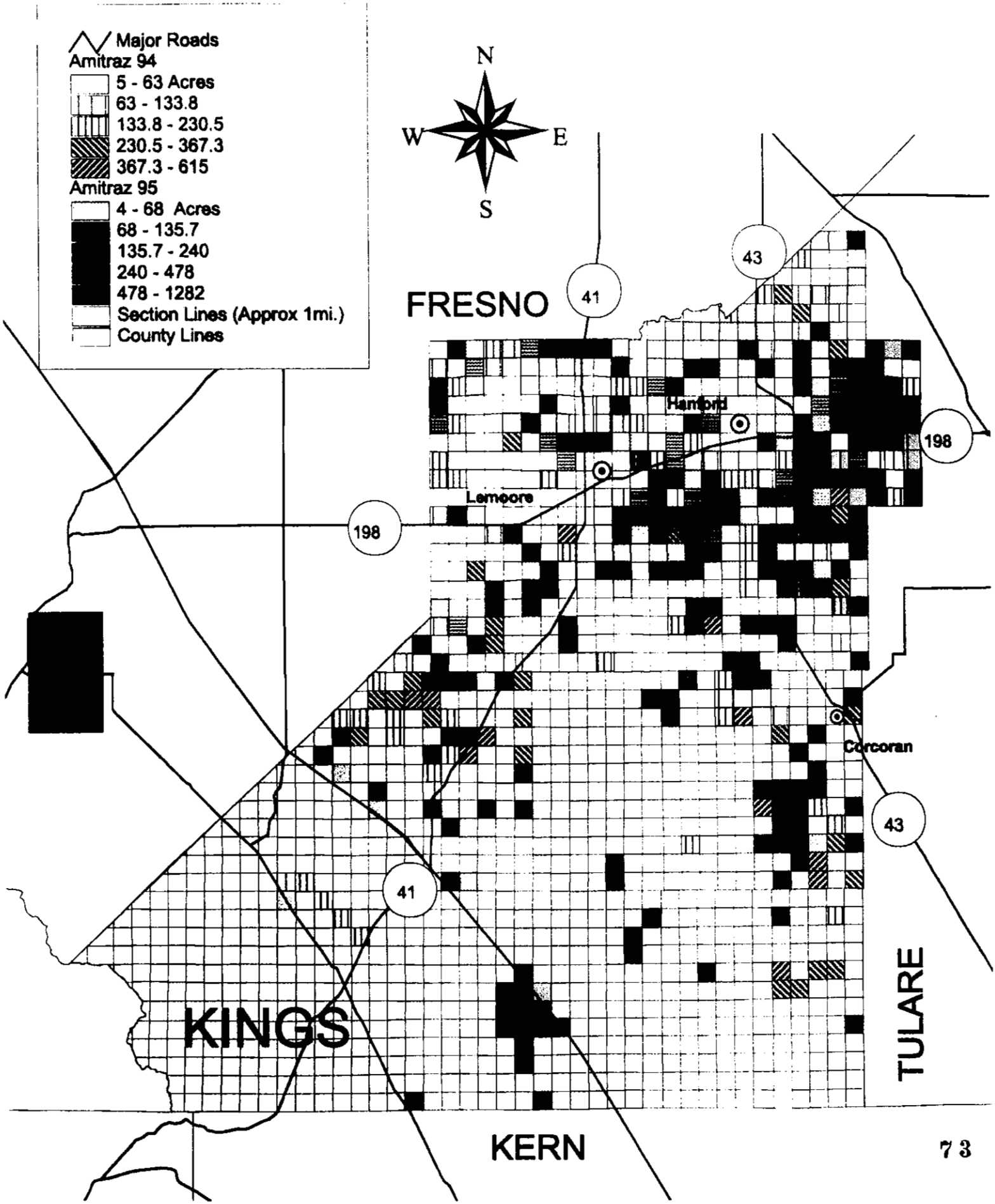
DPR recommends close coordination with the county agricultural commissioner to select the best sampling sites and periods. Three to five sampling sites should be selected in relatively high-population areas or in areas frequented by people. Sampling sites should be located near cotton growing areas. Ambient samples should not be collected from samplers immediately adjacent to fields or orchards where amitraz is being applied. At each site, twenty to thirty discrete 24-hour samples should be taken during the sampling period. Background samples should be collected in an area distant to amitraz applications.

Replicate (collocated) samples are needed for five dates at each sampling location. Two collocated samplers (in addition to the primary sampler) should be run on those days. The date chosen for replicate samples should be distributed over the entire sampling period. They may, but need not be, the same dates at every site. Trip blank and field spike samples should be collected at the same environmental conditions (e.g., temperature, humidity, exposure to sunlight) and experimental conditions (e.g., air flow rates) as those occurring at the time of ambient sampling.

Figure 1. Amitraz Applications to Cotton in Kings County (1994-1995)



Amitraz Applications in Kings Co. 1994-95
Figure 2



2. Application-Site Air Monitoring

The historical trends in amitraz use suggest that application-site air monitoring should be conducted from mid-May through June in Yuba County in association with pre-harvest application to pears (Figure 3). Monitoring should occur at a site of highest rate of use—1.5 pounds AI per acre. Because amitraz applications are limited to three sections in Yuba County (Figure 4), DPR recommends close coordination with the county agricultural commissioner to select the best sampling sites and dates. Amitraz may be intensively applied in nearby pear orchards during this period so care should be taken to prevent nearby applications from contaminating collected samples.

A three day monitoring period should be established with sampling times as follows: application + 1 hour, followed by one 2-hour sample, one 4-hour sample, two 8-hour samples and two 24-hour samples. A minimum of four samplers should be positioned, one on each side of the field. A fifth sampler should be collocated at one position. Since amitraz is extensively used in the area, background samples should collect enough volume (either 12 hours at 15 liters/min. or a shorter period with a higher volume pump) to permit a reasonable minimum detection level. Ideally, samplers should be placed a minimum of 20 meters from the field. Trip blank and field spike samples should be collected at the same environmental conditions (temperature humidity, exposure to sunlight) and experimental conditions (similar air flow rates) as those occurring at the time of sampling.

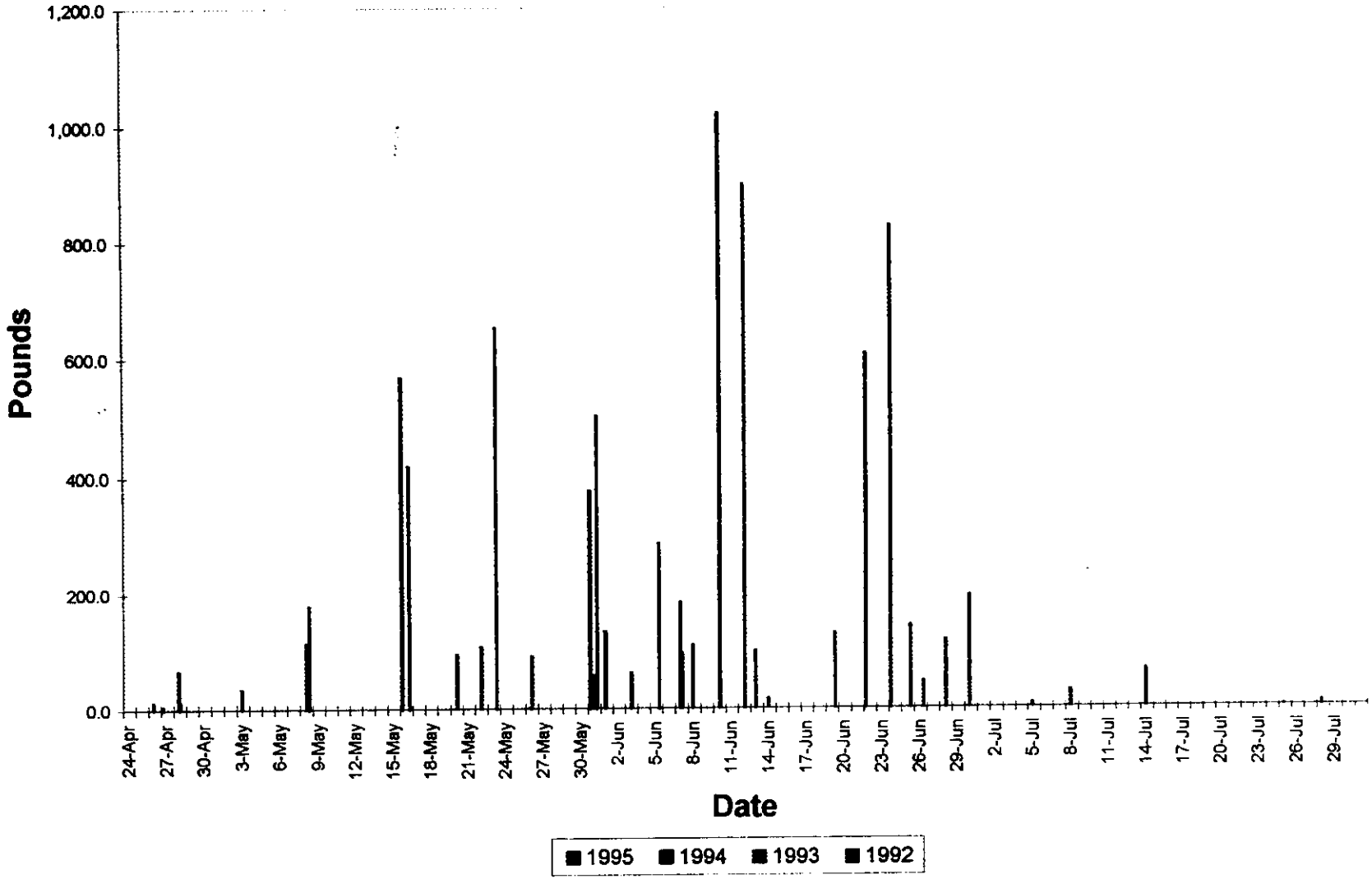
Additionally, we request that you provide in the monitoring report: 1) an accurate record of the positions of the monitoring equipment with respect to the field, including the exact distance that the sampler is positioned from the field; 2) an accurate drawing of the monitoring site showing the precise location of the meteorological equipment, trees, buildings, and other obstacles; 3) meteorological data collected at a minimum of 15-minute intervals including wind speed and direction, humidity, and air temperature, and comments regarding degree of cloud cover; and 4) the elevation of each sampling station with respect to the field, and the orientation of the field with respect to North (identified as either true or magnetic North).

D. SAFETY RECOMMENDATIONS

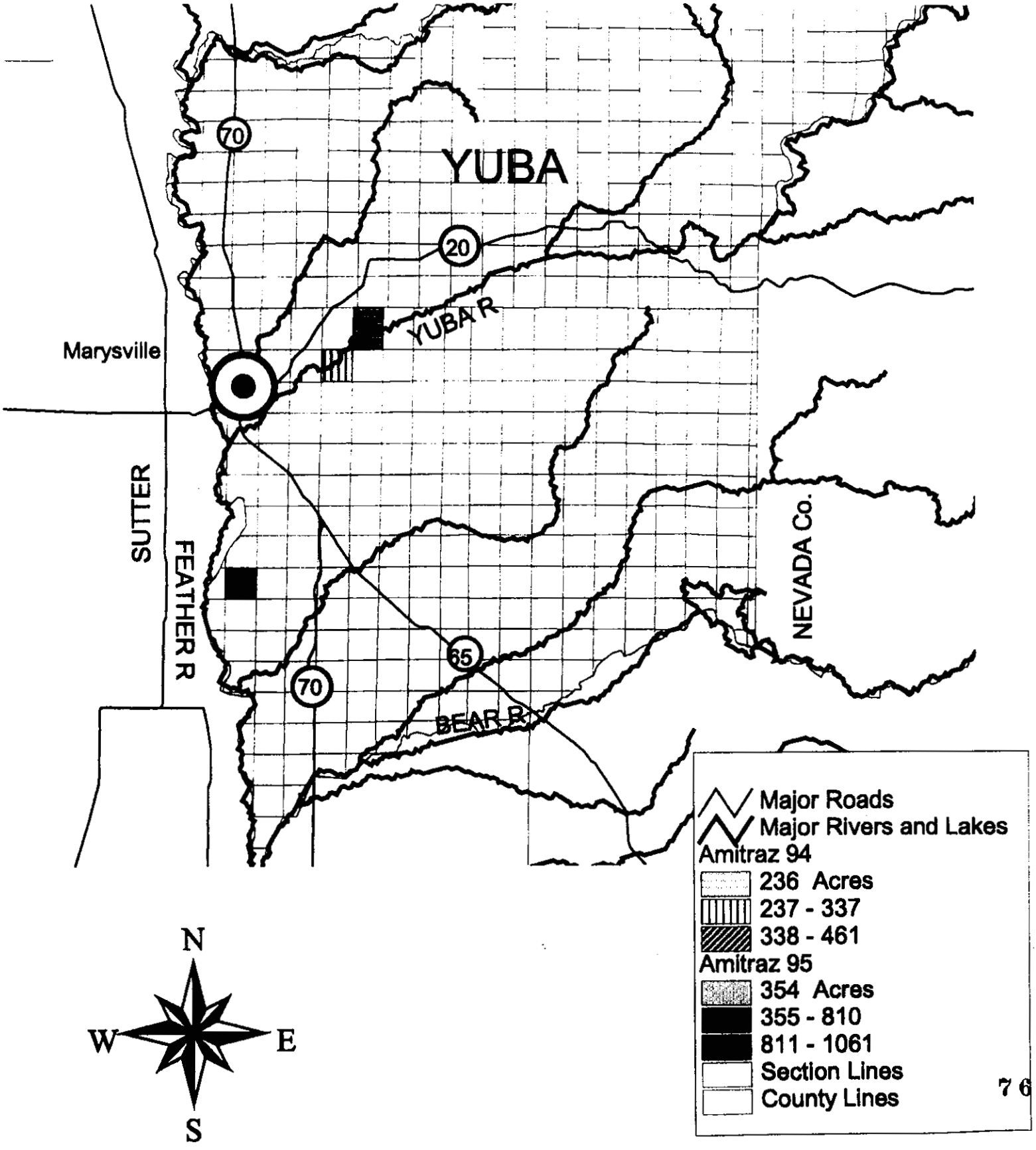
According to the product labels, amitraz is corrosive, causes irreversible eye damage on contact with eyes, and is harmful if absorbed through the skin or inhaled. Repeated skin contact may cause an allergic reaction.

Monitoring personnel should use proper protective equipment to prevent exposure to the vapors or spray mist. According to the product labels, proper protective equipment for applicators includes Tyvek® coveralls over long-sleeved shirt and long pants, chemical

Figure 3. Amitraz Applications in Yuba County to Pears (1992-1995)



Amitraz Applications in Yuba Co. 1994-95
Figure 4

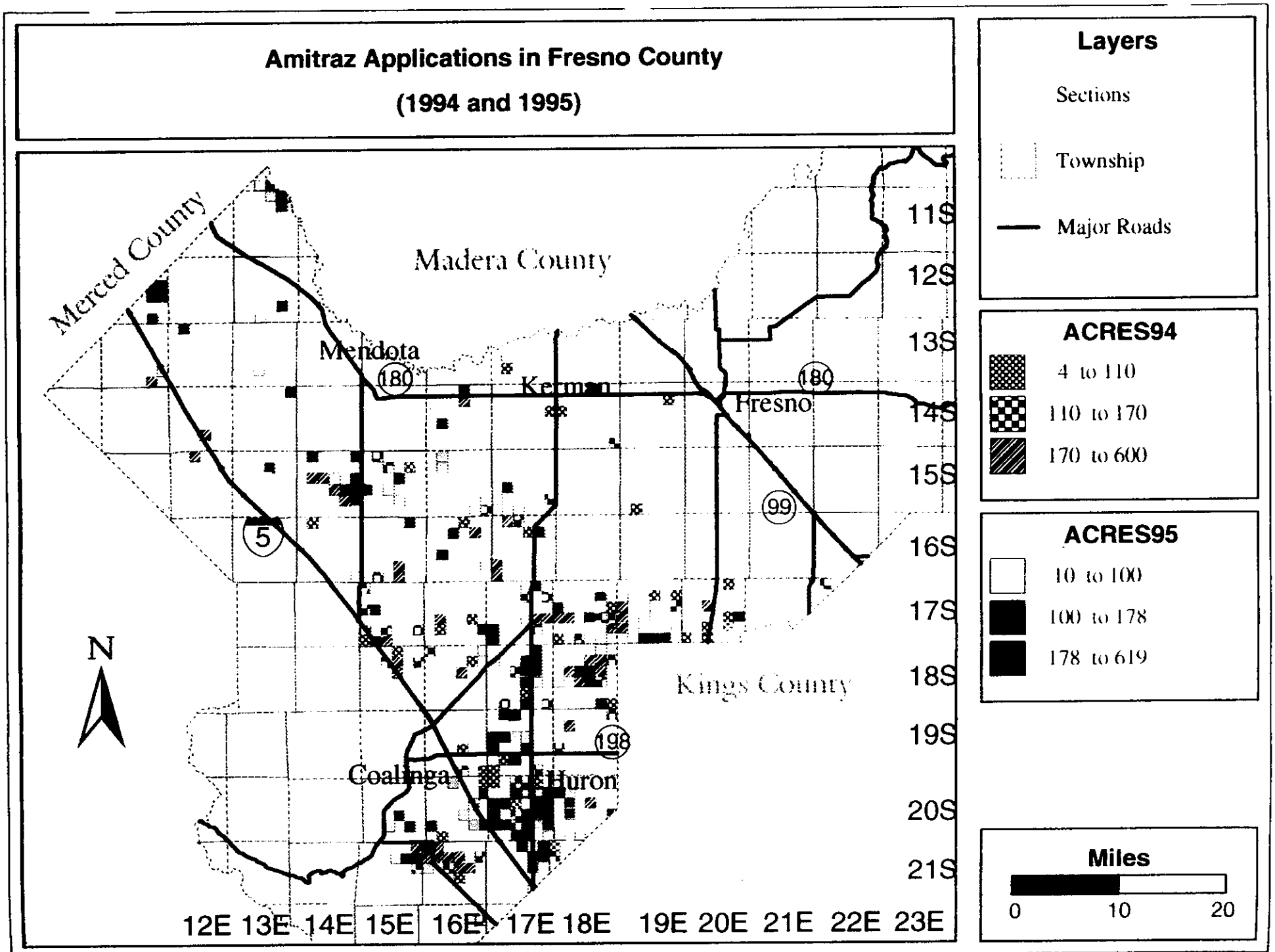


resistant gloves (such as barrier laminate or viton), chemical resistant footwear plus socks, protective eyewear, chemical-resistent headgear for overhead exposure, and a cartridge respirator equiped with a filter cartridge approved for use with pesticides. Monitoring personnel should refer to the label of the actual product used for further precautions.

E. REFERENCES

Kelley, K. and N.R. Reed. 1996. Pesticides for evaluation as candidate toxic air contaminants. Department of Pesticides Regulation. Sacramento, California. Report No. EH 96-01.

Royal Society. 1993. Amitraz. Agrochemicals Handbook, 3rd edition, Royal Society of Chemistry, London.


Amitraz Applications in Fresno County
(1994 and 1995)
Layers
Sections
Township
Major Roads
ACRES94
4 to 110
110 to 170
170 to 600
ACRES95
10 to 100
100 to 178
178 to 619
Miles
0
10
20
Merced County
Madera County
Kings County
Mendota
Kerman
Fresno
Coalinga
Huron
180
180
99
5
198
N
11S
12S
13S
14S
15S
16S
17S
18S
19S
20S
21S
12E 13E 14E 15E 16E 17E 18E 19E 20E 21E 22E 23E

APPENDIX V

APPLICATION AND AMBIENT FIELD LOG SHEETS

SAMPLE FIELD LOG BOOK

Project: Amitraz Application Air Monitoring

Project #: C98-007

Log #	Sample ID	Date On/Off	Time On/Off	Start Flow	End Flow	Comments Roto #	Weather o=overcast pc=partly c=cloudy k=clear	Sampler's Initials
1	NC	8/6/99 8/6	1430 2300	30.0	31.1	30-18	PC	NEM
2	NFS1	8/6/99 8/6	1430 2350	30.0	31.5	30-17		
3	WC	8/6 8/6	1445 2255	30.0	31.6	30-20		
4	WFS2	8/6 8/6	1445 2255	30.0	30.9	30-19		
5	EC	8/6 8/6	1455 2310	30.0	31.2	30-13		
6	SFS3	8/6 8/6	1455 2316	30.0	33.0	30-14		
7	EB	8/6 8/6	1510 2245	30.0	30.0	30-15		
5	EFS4	8/6 8/6	1510 2245	30.0	31.9	30-16		
9	E1	8/6 8/7	2245 0035	30.0	31.4	K 30-15	K	
10	E1C	8/6 8/7	2245 0035	30.0	30.0	L 30-16		
11	S1	8/6 8/7	2310 0045	30.0	30.4			
12	W1	8/6 8/7	2255 0050	30.0	31.2			
13	N1	8/6 8/7	2300 0100	30.0	28.6			
14	E2	8/7 8/7	0035 0745	30.0	29.6	30-16 K	PC	
15	E2C	8/7 8/7	0035 0745	30.0	28.8	30-15 L		
16	S2	8/7 8/7	0045 0750	30.0	30.4	30-13		
17	W2	8/7 8/7	0050 0800	30.0	29.7	30-19		
18	N2	8/7 8/7	0100 0510	30.0	30.0	30-17		
19	E3	8/7 8/7	0745 1930	30.0	29.5	R	PC	
20	E3C	8/7 8/7	0745 1930	30.0	29.0	L		
21	S3	8/7 8/7	0750 1945	30.0	29.0			
22	W3	8/7 8/7	0800 1950	30.0	27.7			
23	N3	8/7 8/7	0510 1955	30.0	29.2			

Appl. Start 11:51
End 0030

SAMPLE FIELD LOG BOOK

Project: Amitraz Application Air Monitoring

Project #: C98-007

Log #	Sample ID	Date On/Off	Time On/Off	Start Flow	End Flow	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Sampler's Initials
24	E4	8/7 8/8	1930 0730	30.0	35.0	"	P-C	KEM
25	E4A	8/7 8/8	1930 0730	30.0	12.7	"		
26	S4	8/7 8/8	1945 0740	30.0	31.2			
27	W4	8/7 8/8	*2020 0750	30.0	31.4	*Changed Generator (at Sample Start)		
28	N4	8/7 8/8	1955 *	30.0	—	*Generator OFF at end		
29	E5	8/8 8/9	0730 0730	30.0	27.5	"	O	KEM
30	E5A	8/8 8/9	0730 0730	30.0	34.4	"		
31	S5	8/8 8/9	0740 0745	30.0	25.7			
* 32	N5	8/8	0750	30.0	—	Generator broke down		
* 33	N5	—	—	—	—	Gen. started Broke down		
34	TB	8/8	0800	—	—	Trip Blank	KEM	
35	TS1	8/8		—	—	Trip Spike		
36	TS2	8/8		—	—	"		
37	TS3	8/8		—	—	"		
38	TS4	8/8		—	—	"		

* Did not collect these samples due to problems with the generator

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SAMPLE FIELD LOG BOOK
Project: Amitraz Ambient Air Monitoring
Project #: C98-008

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Log #	Sample ID	Date On/Off	Time On/Off	Start Flow	End Flow	Start Counter	End Counter	Start Leak Check	End Leak Check	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Sampler's Initials
1	WES1	07/19/99	10:55	30.0	30.0	N/A	N/A	✓	N/A	Prim 30-11	C	SD
		7/20	10 55									
2	HUR1	07/19/99	11:36	30.0	29.8	N/A	N/A	✓	N/A	Prim 30-7	K	SD
		7/20	11.40									
3	SES1	07/19/99	12:11	30.0	29.9	N/A	N/A	✓	N/A	Prim 30.03	K	SD
		7/20	12 30									
4	LHS1	07/19/99	13:50	30.0	26.2	N/A	N/A	✓	N/A	Prim 30.01	K	SD
			1300									
5	ARB1	07/19/99	15:00	30.0	24.5	N/A	N/A	✓	N/A	Prim 30.05	K	SD
		7/20	1500									
6	WES2	7/20	1055	30.0	27.2	N/A	N/A	✓	N/A		K	SD
		7/21	1055									
7	HUR2	7/20	1135	30.0	31.5	N/A	N/A	✓	N/A		K	SD
		7/21	1140									
8	SES2	7/20	1230	30.0	28.7	N/A	N/A	✓	N/A		K	SD
		7/21	12:35									
9	LHS2	7/20	1300	30.0	29.1	N/A	N/A	✓	N/A		K	SD
		7/21	1305									
10	ARB2	7/20	1510	30.0	29.9	N/A	N/A	✓	N/A		K	SD
		7/21	1010									

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SAMPLE FIELD LOG BOOK
Project: Amitraz Ambient Air Monitoring
Project #: C98-008

AMITRAZ !

Log #	Sample ID	Date On/Off	Time On/Off	Start Flow	End Flow	Start Counter	End Counter	Start Leak Check	End Leak Check	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Sampler's Initials
11	WES 3	7/21/98	10:55	30.0	28.1	N/A		✓			K	CBC
		7/22	1050									
12	WES 3D	7/21	10:55	30.0	27.8	N/A		✓			K	CBC
		7/22	1050									
13	HUR 3	7/21	1140	30.5	29.8	N/A		✓			K	CBC
		7/22	1140									
14	HUR 3D	7/21	1140	30.0	28.1	N/A		✓			K	CBC
		7/22	1140									
15	SES 3	7/21	1235	30.0	30.0	N/A		✓			K	CBC
		7/22	1235									
16	SES 3D	7/21	1235	30.0	27.1	N/A		✓			K	CBC
		7/22	1235									
17	LHS 3	8/21	1305	30.0	29.0	N/A		✓			K	CBC
		7/22	1306									
18	LHS 3D	7/21	1305	30.0	31.1	N/A		✓			K	CBC
		7/22	1305									
19	ARB 3	7/21	1510	30.0	31.2	N/A		✓			K	CBC
		7/22										
20	ARB 3D	7/21	1510	30.0	28.1	N/A		✓			K	CBC
		7/22										
21	WES 4	7/22	1050	30.0	23.3	N/A		✓			K	CBC
		7/23	1050									
22	HUR 4	7/22	1140	30.0	22.7	N/A		✓			K	CBC
		7/22	1140									
23	SES 4	7/22	1235	30.0	28.1	N/A		✓			K	CBC
		7/23	1235									
24	LHS 4	7/22	1305	30.0	22.8	N/A		✓			K	CBC
		7/23	1305									
25	ARB 4	7/22	1505	30.0	24.0	N/A		✓			K	CBC
		7/23	1605									
..												

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SAMPLE FIELD LOG BOOK
Project: Amitraz Ambient Air Monitoring
Project #: C98-008

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Log #	Sample ID	Date On/Off	Time On/Off	Start Flow	End Flow	Start Counter	End Counter	Start Leak Check	End Leak Check	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Sampler's Initials
26	WES5	7/26 7/28	1045 1045	30.0	31.0	N/A		✓			k	
27	HUR5	7/26 7/28	1140 1140	30.0	28.5	N/A		✓			pc	
28	SES5	7/26 7/28	1235 1235	30.0	29.0	N/A		✓			k	
29	LHS5	7/26 7/28	1305 1305	30.0	30.2	N/A		✓			k	
30	ARB5	7/26 7/28	1515 1525	30.0	31.1	N/A		✓			PC	
31	WES6	7/28 7/29	1045 1040	30.0	29.0	N/A		✓			k	
32	WES6D	7/28	1045 1040	30.0	28.5	N/A		✓			k	
33	HUR6	7/28	1135 1135	30.0	29.1	N/A		✓			k	
34	HUR6D	7/28	1135 1135	30.0	31.4	N/A		✓			k	
35	SES6	7/28	1235 1235	30.0	27.0	N/A		✓			pc	
36	SES6D	7/28	1235 1235	30.0	28.9	N/A		✓			pc	
37	LHS6	7/28	1305 1305	30.0	30.1			✓			pc	
38	LHS6D	7/28	1305 1305	30.0	29.8			✓			pc	
39	ARB6	7/28	1520 1520	30.0	30.0			✓			pc	
40	ARB6D	7/28	1520 1520	30.0	28.1			✓			pc	

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SAMPLE FIELD LOG BOOK
Project: Amitraz Ambient Air Monitoring
Project #: C98-008

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Log #	Sample ID	Date On/Off	Time On/Off	Start Flow	End Flow	Start Counter	End Counter	Start Leak Check	End Leak Check	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Sampler's Initials
41	WEST	7/29 7/30	1040 1040	30.0	24.0	N/A		✓	N/A		k	AK
42	HUET	7/29 7/30	1135 1135	30.0	24.0	↓		✓	↓		k	CBO
43	SEST	7/29 7/30	1236 1235	30.0	20.7	↓		✓	↓		k	CBO
44	LHST	7/29 7/30	1305 1305	30.0	26.2	↓		✓	↓		k	CBO
45	ARBT	7/29 7/30	1520 1525	30.0	24.5	✓		✓	✓		k	CBO

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SAMPLE FIELD LOG BOOK
Project: Amitraz Ambient Air Monitoring
Project #: C98-008

AMITRAZ !

Log #	Sample ID	Date On/Off	Time On/Off	Start Flow	End Flow	Start Counter	End Counter	Start Leak Check	End Leak Check	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Sampler's Initials
46	WES 8	8/2/99	1045	30.0	N/A	N/A	N/A		N/A	site was being soaked by sprinkler	K	
		8/3	1045									
47	HUR 8	8/2/99	1130	30.0	↓			↓			K	
		8/3	1130									
48	SES 8	8/2	1235	30.0				↓			K	
		8/3	1235									
49	LHS 8	8/2	1305					↓			K	
		8/3	1255									
50	ARB 8	8/2	1410					↓	↓		K	
		8/3			↓	↓	↓					
51	TB 1	8/2/99	1120	N/A	N/A	N/A	N/A	N/A	N/A		K	
		8/2	1120									
52	WES 9	8/3	1045	30.0	29.8	N/A	N/A	N/A	N/A		K	CBO
		8/4	1045									
53	HUR 9	8/3	1130	30.0	30.2	↓	↓	↓	↓		K	CBO
		8/4	1130									
54	SES 9	8/3	1235	30.0	28.1						K	CBO
		8/4	1235									
55	LHS 9	8/3	1255	30.0	27.0						K	CBO
		8/4	1255									
56	ARB 9	8/3	1510	30.0	29.5	↓	↓	↓	↓		K	CBO
		8/4	1505									

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SAMPLE FIELD LOG BOOK
Project: Amitraz Ambient Air Monitoring
Project #: C98-008

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Log #	Sample ID	Date On/Off	Time On/Off	Start Flow	End Flow	Start Counter	End Counter	Start Leak Check	End Leak Check	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Sampler's Initials
57	WES10	8/4 8/5	1045 1045	30.0	29.0	N/A	N/A	N/A	N/A		k	CBO
58	WES10D	8/4 8/5	1045 1045	30.0	29.5	↓	↓	↓	↓		k	CBO
59	HUR10	8/4 8/5	1130 1130	30.0	27.3						k	CBO
60	HUR10D	8/4 8/5	1130 1130	30.0	26.0						k	CBO
61	SES10	8/4 8/5	1235 1235	30.0	25.1						k	CBO
62	SES10D	8/4 8/5	1235 1235	30.0	26.1						k	CBO
63	LHS10	8/4 8/5	1255 1255	30.0	29.0						k	CBO
64	LHS10D	8/4 8/5	1255 1255	30.0	28.5						k	CBO
65	ARB10	8/4 8/5	1505 1505	30.0	29.5						k	CBO
66	ARB10D	8/4 8/5	1505 1505	30.0	27.0						k	CBO

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SAMPLE FIELD LOG BOOK
Project: Amitraz Ambient Air Monitoring
Project #: C98-008

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Log #	Sample ID	Date On/Off	Time On/Off	Start Flow	End Flow	Start Counter	End Counter	Start Leak Check	End Leak Check	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Sampler's Initials
67	WES 11	8/5 8/10	1045 1045	30.0	29.5	N/A	N/A	N/A	N/A		K	CBO
68	HUR 11	8/5 8/10	1130 1130	30.0	29.0						K	CBO
69	SES 11	8/5 8/10	1230 1225	30.0	30.0						K	CBO
70	LHS 11	8/5 8/10	1255 1255	30.0	26.5						K	CBO
71	ARB 11	8/5 8/10	1505 1500	30.0	29.8						K	CBO
72	HEL 12	8/9 8/10	10:00 10:00	30.0	32.1						~~PC~~ C	CBO
73	WES 12	8/9 8/10	10:25 10:25	30.0	31.5						C	CBO
74	HUR 12	8/9 8/10	11:10 11:05	30.0	33.0						PC	CBO
75	LHS 12	8/9 8/10	1145 1145	30.0	32.5						C	CBO
76	SES 12	8/9 8/10	1205 1205	30.0	34.0						C	CBO
77	ARB 12	8/9 8/10	1530 1530	30.0	31.5						C	CBO
78	TB2	8/9 8/10	1530 ~~1530~~	~~30~~ NA	NA	↓	↓	↓	↓		C	CBO

AMITRAZ !

SAMPLE FIELD LOG BOOK
Project: Amitraz Ambient Air Monitoring
Project #: C98-008

AMITRAZ !

Log #	Sample ID	Date On/Off	Time On/Off	Start Flow	End Flow	Start Counter	End Counter	Start Leak Check	End Leak Check	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Sampler's Initials
79	HEL13	8/10 / 8/11	10:00 / 1015	30.0	15.0	NA	N/A	✓	NA		PC	SJ
80	HEL13D	8/10 / 8/11	10:00 / 1015	30.0	24.7			✓			PC	SJ
81	WES13	8/10 / 8/11	1025 / 1040	30.0	20.0			✓			K	SJ
* 82	WES13D	8/10 / 8/11	1025	30.0	X			✓		Missing	K	SJ
83	HUR13	8/10 / 8/11	1105 / 1115	30.0	26.2			✓			K	SJ
84	HUR13D	8/10 / 8/11	1105 / 1115	30.0	16.0			✓			K	SJ
85	LHS13	8/10	1150	30.0	15.1			✓			K	SJ
86	LHS13D	8/10	1150	30.0	20.0			✓			K	SJ
87	SES13	8/10	1210	30.0	20.0			✓			K	SJ
88	SES13D	8/10	1210	30.0	20.0			✓		Foil Fell off	K	SJ
89	ARB13	8/10 / 8/11	1645	30.0	20.0			✓			K	SJ
90	ARB13D	8/10 / 8/11	1645	30.0	16.0			✓			K	SJ
91	HEL14	8/11 / 8/12	1025 / 1025	30.0	39.3			✓		spraying herbicide next to eight w/in OSR	K	SJ
92	HUR14	8/11 / 8/12	1120 / 1125	30.0	35.2			✓			K	SJ
93	LHS14	8/11 / 8/12	1210 / 1210	30.0	31.8			✓			K	SJ
94	SES 14	8/11 / 8/12	1150 / 1250	30.0	23.7			✓			K	SJ
95	ARB14	8/11	1450									

AMITRAZ !

SAMPLE FIELD LOG BOOK
Project: Amitraz Ambient Air Monitoring
Project #: C98-008

AMITRAZ !

Log #	Sample ID	Date On/Off '99	Time On/Off	Start Flow	End Flow	Start Counter	End Counter	Start Leak Check	End Leak Check	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Sampler's Initials
96	WES14	8/11 8/12	1050 1050	30.0	32.0	NA	NA	✓	NA		K	SD
97	HEL 15	8/12 8/13	1025 1025	30.0	32.3	↓	↓	✓	↓		K	SD
98	WES15	8/12 8/13	1050 1050	30.0	30.0			✓			K	SD
99	HUR15	8/12 8/13	1130 1130	30.0	30.0			✓			K	SD
100	LHS15	8/12 8/13	1210 1210	30.0	30.0			✓			K	SD
101	SES15	8/12 8/13	1250 1250	30.0	29.5			✓			K	SD
102	ARB15	8/12 8/13	1620 1620	30.0	32.4			✓			K	SD
103	HEL WES16	8/16 8/17	1830 1035	30.0	40.0			✓			K	CBO
104	WES16	8/16 8/17	1100 1105	30.0	32.1			✓			K	CBO
* 105	HUR16	8/16 8/17	1140 1145	30.0	—			✓		5 taped on Pump 2 days	K	CBO
106	SES16	8/16 8/17	1210 1220	30.0	30.0			✓			K	CBO
107	LHS16	8/16 8/17	1240 1250	30.0	26.1			✓			K	CBO
108	ARB16	8/16 8/17	1535 1545	30.0	29.0			✓			K	CBO

AMITRAZ !

SAMPLE FIELD LOG BOOK
Project: Amitraz Ambient Air Monitoring
Project #: C98-008

AMITRAZ !

1999

Log #	Sample ID	Date On/Off	Time On/Off	Start Flow	End Flow	Start Counter	End Counter	Start Leak Check	End Leak Check	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Sampler's Initials
109	HEL 17	8/17	10:35	30.0	17.0	NA	NA	✓	NA		K	CBO
		8/18	1135									
110	HEL 17D	8/17	1025	30.0	33.0			✓			K	CBO
		8/18	1035									
111	WES 17	8/17	1105	30.0	23.0			✓			K	CBO
		8/18	1105									
112	WES 17D	8/17	1105	30.0	20.0			✓			K	CBO
		8/18	1105									
* 113	HUR 17	8/17	1145	—	—			—		SIGHT WAS	K	CBO
		8/18	1145									
* 114	HUR 17D	8/17	1145	—	—			—		LOCKED, NO ADMINISTRATOR	K	CBO
		8/18	1145									
115	SES 17	8/17	1220	30.0	30.0			✓			K	CBO
		8/18	1250									
116	SES 17D	8/17	1220	30.0	30.0			✓			K	CBO
		8/18	1250									
117	LHS 17	8/17	1250	30.0	30.0			✓		large spider inside Filter, No end Flow check	K	CBO
		8/18	1330									
118	LHS 17D	8/17	1250	30.0	30.0			✓			K	CBO
		8/18	1330									
119	ARB 17	8/17	1545	30.0	30.0			✓				
		8/18	1625									
120	ARB 17D	8/17	1545	30.0	28.9			✓				
		8/18	1625									
121									✓			

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AMITRAZ !

SAMPLE FIELD LOG BOOK
Project: Amitraz Ambient Air Monitoring
Project #: C98-008

AMITRAZ !

Log #	Sample ID	Date On/Off	Time On/Off	Start Flow	End Flow	Start Counter	End Counter	Start Leak Check	End Leak Check	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Sampler's Initials
121	HEL 18	8/18	935	30.0	28.1			✓			K	
		8/19	855									
122	WES 18	8/18	1105	30.0	31.5			✓			K	
		8/19	820									
123	HUR 18	8/18	1145	30.0	32.0			✓			K	
		8/19	845									
124	HUR 19D	8/18	1145	30.0	26.5			✓			K	
		8/19	845									
125	~~SES 18 LHS 18~~	~~1250~~	1250	30.0	30.0			✓			K	
		8/19	1000									
126	LHS 18	~~1335~~	1335	30.0	36.0			✓			K	
		8/19	1100									
127	ARB 18	8/18	1500	30.0	30.0			✓			K	
		8/19	1500									
128	HEL 19	~~8/19~~	~~855~~	30.0	20.0			✓			K	
		~~8/20~~	1320									
129	WES 19	~~8/19~~	820	30.0	26.8			✓			K	
		8/20	1040									
130	AUR 19	~~8/19~~	845	30.0	29.3			✓		Teaspoon and ½ BT recon Fell out	K	
		~~8/20~~	1110									
131	LHS 19	8/19	935	30.0	26.7			✓			K	
		8/20	115									
132	SES 19	8/19	1000	30.0	27.0			✓			K	
		8/20	1220									
153	ARBA	8/19	1500	30.0	30.0			✓			K	
		8/20	1545									

AMITRAZ !

SAMPLE FIELD LOG BOOK
Project: Amitraz Ambient Air Monitoring
Project #: C98-008

AMITRAZ !

Log #	Sample ID	Date On/Off 99	Time On/Off	Start Flow	End Flow	Start Counter	End Counter	Start Leak Check	End Leak Check	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Sampler's Initials
134	HEL 20	8/23	1035	30	35	NA	NA	✓	NA		K	
		8-24	1020									
135	WES 20	8/23	1030	30	39			✓	✓		K	
		8-24	1040									
136	HUR 20	8/23	1115	30	34			✓			K	
		8-24	1120									
137	SES 20	8/23	1245	30	28			✓			K	
		8-24	1235									
138	LHS 20	8/23	1220	30	41			✓			K	
		8-24	1210									
139	ARB 20	8/23	1515	30	27			✓			K	
		8-24	1540									
140	TB 3	8/23	1245	NA	NA			✓			K	
		8/23	1245									
141	Hel 21	8-24	1020	30	31			✓			K	
		8-25	0830									
142	Hel 21D	8-24	1020	30	23			✓			K	
		8-25	0830									
143	wes 21	8-24	1040	30	26			✓			K	
		8-25	0930									
144	wes 21D	8-24	1040	30	24			✓			K	
		8-25	1050									
145	Hur 21	8-24	1120	30	28			✓			K	✓
		8-25	1130									
146	Hur 21D	8-24	1120	30	29			✓			K	SV
		8-25	1130									
147	Ses 21	8-24	1235	30	27			✓			K	SV
		8-25	1230									
148	SES 21D	8-24	1225	30	30			✓			K	SV
		8-25	1230									
						✓	✓		✓			

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AMITRAZ !

SAMPLE FIELD LOG BOOK
Project: Amitraz Ambient Air Monitoring
Project #: C98-008

AMITRAZ !

Log #	Sample ID	Date On/Off	Time On/Off	Start Flow	End Flow	Start Counter	End Counter	Start Leak Check	End Leak Check	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Sampler's Initials
149	LHS21	8-24 / 8-25	1210 / 1210	30	29	NA	NA	✓	NA			
150	LHS21D	8-24 / 8-25	1210 / 1210	30	28			✓				
151	ARB21	8-24 / 8-25	1540 / 1540	30	30			✓				
152	ARB21D	8-24 / 8-25	1540 / 1540	30	27			✓				
153	Hel22	8-25 /	1020 / 1020	30	29			✓				
154	Wes22	8-25 / 8-26	1050 / 1045	30	30			✓				
155	Hur22	8-25 / 8-26	1120 / 1120	30	33			✓				
156	Sis22	8-25 / 8-26	1135 / 1130	30	32			✓				
157	CHS22	8-25 / 8-26	1210 / 1210	30	30			✓				
158	ARB22	8-25 / 8-26	1530 / 1520	30	30			✓				
159	PFS813	8-25 / 8-26	1530 / 1520	30	30			✓		Field Spikes		
160	PFS813	8-25 / 8-26	1530 / 1520	30	29	↓	↓	✓	✓	Field spikes	↓	↓

AMITRAZ !

SAMPLE FIELD LOG BOOK
Project: Amitraz Ambient Air Monitoring
Project #: C98-008

AMITRAZ !

Log #	Sample ID	Date On/Off 99	Time On/Off	Start Flow	End Flow	Start Counter	End Counter	Start Leak Check	End Leak Check	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Sampler's Initials
161	Ha123	8-26 8/27	1020 1030	30	38.8			✓			~~pc~~ O	MA
162	Vc523	8-26 8/27	1035 1050	30	32.6			✓			~~f~~ c O	MA
163	Hur23	8-26 8/27	11 20 11 20	30	37.4			✓			O	MA
~~164~~	~~[illegible]~~	~~8-26~~ ~~8/27~~	~~1130~~ ~~[illegible]~~	~~N/A~~	~~[illegible]~~			✓		No Filters	O	MA
165	LH523	8-26 8/27	1210 1210	30	36.1			✓		~~[illegible]~~		
~~166~~	~~[illegible]~~	~~8-26~~ ~~8/27~~	~~[illegible]~~ ~~[illegible]~~	~~N/A~~				✓		No Filters		

APPENDIX VI

AMITRAZ APPLICATION METEOROLOGICAL DATA

Amitraz Application Meteorological Data

Export Filename : C:\MICROMET\AMIT15\EXPORT\99071309.TXT

Export data for station : Amitraz15

Date	Time	WS (mph)	WD (Deg)	AT (Deg F)	RH (%)	BP (inHg)	Sigma (Deg)
8/6/99	11:00	5.7	311	66	62	29.78	75.7
8/6/99	11:15	6.3	331	66	61	29.79	39.8
8/6/99	11:30	6.6	319	66	61	29.80	15.3
8/6/99	11:45	5.5	325	67	59	29.80	16.6
8/6/99	12:00	4.6	340	68	56	29.80	16.3
8/6/99	12:15	2.8	272	70	53	29.80	48.1
8/6/99	12:30	2.1	242	71	51	29.81	60.8
8/6/99	12:45	3.1	357	74	49	29.81	67.2
8/6/99	13:00	3.0	318	73	49	29.82	77.4
8/6/99	13:15	3.8	215	74	48	29.82	35.7
8/6/99	13:30	3.4	199	75	47	29.82	72.9
8/6/99	13:45	4.8	273	74	48	29.82	67.1
8/6/99	14:00	4.4	176	74	46	29.82	62.8
8/6/99	14:15	3.7	118	76	45	29.82	50.9
8/6/99	14:30	3.9	233	76	45	29.82	72.9
8/6/99	14:45	2.7	261	78	43	29.82	84.7
8/6/99	15:00	4.8	285	77	46	29.82	46.8
8/6/99	15:15	5.8	316	76	46	29.81	40.3
8/6/99	15:30	3.7	296	77	44	29.81	67.1
8/6/99	15:45	4.1	193	78	42	29.80	75.5
8/6/99	16:00	5.0	4	78	43	29.79	29.2
8/6/99	16:15	5.2	326	78	43	29.78	23.3
8/6/99	16:30	4.9	331	77	43	29.79	29.3
8/6/99	16:45	3.5	13	78	41	29.79	79.4
8/6/99	17:00	5.9	347	78	42	29.78	29.4
8/6/99	17:15	5.9	342	78	42	29.78	24.1
8/6/99	17:30	5.5	344	78	41	29.78	27.4
8/6/99	17:45	4.5	1	78	40	29.77	28.7
8/6/99	18:00	5.3	326	77	41	29.77	16.9
8/6/99	18:15	3.1	312	77	41	29.76	23.9
8/6/99	18:30	3.9	328	78	42	29.76	13.2
8/6/99	18:45	5.3	329	77	42	29.76	14.2
8/6/99	19:00	5.2	340	76	43	29.75	12.6
8/6/99	19:15	5.7	339	76	43	29.75	9.8
8/6/99	19:30	4.8	332	75	45	29.75	8.5
8/6/99	19:45	5.1	342	74	48	29.75	6.9
8/6/99	20:00	5.1	337	72	51	29.75	7.2
8/6/99	20:15	5.8	340	71	52	29.74	7.7
8/6/99	20:30	7.5	330	71	53	29.74	7.8
8/6/99	20:45	7.5	322	69	55	29.75	7.8
8/6/99	21:00	6.8	319	68	56	29.75	7.8
8/6/99	21:15	8.2	317	68	56	29.75	8.1
8/6/99	21:30	6.3	323	66	59	29.75	7.0
8/6/99	21:45	8.4	329	66	59	29.75	9.9

Amitraz Application Meteorological Data

Export Filename : C:\MICROMET\AMIT15\EXPORT\99071309.TXT

Export data for station : Amitraz15

8/6/99	22:00	8.7	328	66	60	29.75	8.6
8/6/99	22:15	7.8	331	65	62	29.76	8.0
8/6/99	22:30	6.9	319	64	65	29.75	10.6
8/6/99	22:45	6.4	316	63	67	29.76	7.0
8/6/99	23:00	6.6	318	62	68	29.76	7.2
8/6/99	23:15	7.2	320	62	67	29.76	7.5
8/6/99	23:30	7.9	325	62	65	29.75	8.0
8/6/99	23:45	8.8	329	62	63	29.75	8.0
8/6/99	24:00:00	8.7	328	62	63	29.76	8.5
8/7/99	0:15	8.7	331	62	62	29.76	9.0
8/7/99	0:30	9.9	333	61	61	29.76	8.3
8/7/99	0:45	10.0	330	61	62	29.76	8.0
8/7/99	1:00	9.6	326	60	64	29.76	8.6
8/7/99	1:15	7.7	322	60	67	29.76	8.3
8/7/99	1:30	7.8	323	60	68	29.75	8.2
8/7/99	1:45	8.1	328	60	68	29.75	8.2
8/7/99	2:00	8.3	327	60	69	29.75	9.1
8/7/99	2:15	8.7	330	61	70	29.75	7.5
8/7/99	2:30	8.4	328	60	71	29.75	8.3
8/7/99	2:45	8.2	327	60	72	29.75	7.8
8/7/99	3:00	7.7	327	60	72	29.75	8.7
8/7/99	3:15	7.0	321	59	74	29.75	7.7
8/7/99	3:30	7.1	317	59	74	29.76	8.2
8/7/99	3:45	7.1	303	59	75	29.76	8.2
8/7/99	4:00	6.5	303	59	76	29.77	7.1
8/7/99	4:15	5.5	289	58	76	29.76	9.6
8/7/99	4:30	5.0	296	57	78	29.76	8.2
8/7/99	4:45	6.0	290	57	78	29.76	6.7
8/7/99	5:00	5.4	294	57	79	29.76	12.3
8/7/99	5:15	5.7	302	57	79	29.77	9.0
8/7/99	5:30	5.8	294	57	79	29.77	7.4
8/7/99	5:45	5.8	303	56	80	29.77	7.7
8/7/99	6:00	5.9	292	56	80	29.77	6.4
8/7/99	6:15	7.1	299	56	80	29.77	7.9
8/7/99	6:30	6.4	299	56	81	29.77	7.8
8/7/99	6:45	5.4	296	57	79	29.78	9.5
8/7/99	7:00	5.2	308	57	79	29.78	9.8
8/7/99	7:15	4.8	314	58	78	29.78	8.2
8/7/99	7:30	4.9	312	58	77	29.79	10.0
8/7/99	7:45	6.3	315	60	75	29.79	11.5
8/7/99	8:00	8.1	323	62	72	29.80	10.2
8/7/99	8:15	9.7	329	63	70	29.81	10.0
8/7/99	8:30	11.1	338	63	68	29.82	7.9
8/7/99	8:45	9.7	337	64	66	29.83	9.8
8/7/99	9:00	9.3	330	65	64	29.83	11.3
8/7/99	9:15	8.8	326	66	63	29.84	11.1

Amitraz Application Meteorological Data

Export Filename : C:\MICROMET\AMIT15\EXPORT\99071309.TXT

Export data for station : Amitraz15

8/7/99	9:30	9.3	324	66	62	29.84	12.8
8/7/99	9:45	9.2	332	67	60	29.85	11.3
8/7/99	10:00	9.5	342	68	59	29.85	11.9
8/7/99	10:15	10.2	333	68	58	29.86	13.7
8/7/99	10:30	10.0	340	68	58	29.86	13.3
8/7/99	10:45	9.5	324	69	58	29.86	12.4
8/7/99	11:00	9.6	328	69	56	29.87	10.5
8/7/99	11:15	8.6	338	70	55	29.87	14.1
8/7/99	11:30	8.4	326	71	55	29.87	16.4
8/7/99	11:45	7.7	337	72	52	29.87	16.8
8/7/99	12:00	7.6	336	73	53	29.87	20.0
8/7/99	12:15	6.1	340	73	52	29.88	22.4
8/7/99	12:30	5.7	340	74	50	29.88	17.1
8/7/99	12:45	5.2	317	74	49	29.88	21.6
8/7/99	13:00	4.8	327	75	48	29.87	23.2
8/7/99	13:15	4.2	324	75	49	29.88	31.1
8/7/99	13:30	4.6	317	76	48	29.87	17.6
8/7/99	13:45	3.9	320	78	44	29.87	50.4
8/7/99	14:00	3.8	323	78	44	29.87	33.4
8/7/99	14:15	3.1	305	80	41	29.87	63.1
8/7/99	14:30	4.4	289	78	43	29.87	26.4
8/7/99	14:45	3.5	236	79	40	29.86	24.1
8/7/99	15:00	4.4	306	80	38	29.86	23.5
8/7/99	15:15	3.8	301	80	39	29.86	33.8
8/7/99	15:30	3.8	354	81	37	29.85	78.7
8/7/99	15:45	4.0	348	82	36	29.85	61.5
8/7/99	16:00	2.7	258	80	39	29.85	29.5
8/7/99	16:15	3.6	341	80	40	29.84	91.2
8/7/99	16:30	6.7	88	79	41	29.84	15.3
8/7/99	16:45	7.5	90	79	42	29.83	12.0
8/7/99	17:00	6.2	77	80	40	29.83	20.0
8/7/99	17:15	4.9	106	80	39	29.82	22.4
8/7/99	17:30	5.0	84	80	39	29.82	19.6
8/7/99	17:45	6.0	17	80	38	29.82	30.0
8/7/99	18:00	4.7	333	79	39	29.81	14.4
8/7/99	18:15	5.6	319	79	42	29.80	13.7
8/7/99	18:30	5.7	330	79	41	29.80	11.4
8/7/99	18:45	5.3	319	79	41	29.80	13.3
8/7/99	19:00	4.6	316	78	44	29.79	9.5
8/7/99	19:15	4.7	305	77	45	29.79	6.9
8/7/99	19:30	4.7	306	76	44	29.79	5.4
8/7/99	19:45	4.8	300	76	45	29.79	3.1
8/7/99	20:00	4.4	301	75	45	29.79	2.6
8/7/99	20:15	5.2	302	74	47	29.79	4.9
8/7/99	20:30	5.9	306	73	52	29.79	4.7
8/7/99	20:45	5.8	311	71	54	29.79	4.5

Amitraz Application Meteorological Data

Export Filename : C:\MICROMET\AMIT15\EXPORT\99071309.TXT

Export data for station : Amitraz15

8/7/99	21:00	5.1	319	71	55	29.79	6.1
8/7/99	21:15	5.7	316	71	54	29.79	5.0
8/7/99	21:30	5.0	322	70	56	29.79	15.1
8/7/99	21:45	6.5	321	69	59	29.79	11.0
8/7/99	22:00	7.4	308	68	60	29.80	6.7
8/7/99	22:15	6.4	314	67	62	29.80	6.8
8/7/99	22:30	6.9	311	66	62	29.79	8.0
8/7/99	22:45	6.1	310	65	65	29.79	7.3
8/7/99	23:00	6.5	315	65	66	29.79	7.8
8/7/99	23:15	8.2	315	65	63	29.79	7.2
8/7/99	23:30	6.6	308	64	65	29.79	7.0
8/7/99	23:45	6.7	304	64	67	29.79	6.0
8/7/99	24:00:00	6.7	299	63	68	29.79	7.3
8/8/99	0:15	7.9	296	63	66	29.79	7.5
8/8/99	0:30	8.1	296	64	66	29.79	7.3
8/8/99	0:45	7.8	296	63	67	29.78	7.4
8/8/99	1:00	9.4	299	63	66	29.78	7.8
8/8/99	1:15	9.5	303	63	67	29.78	8.3
8/8/99	1:30	9.7	307	63	67	29.78	7.8
8/8/99	1:45	9.3	309	62	68	29.78	7.9
8/8/99	2:00	9.9	307	62	67	29.78	7.4
8/8/99	2:15	9.9	305	62	67	29.77	7.8
8/8/99	2:30	9.4	307	62	67	29.77	7.5
8/8/99	2:45	9.1	305	62	68	29.77	7.1
8/8/99	3:00	8.5	308	61	68	29.77	7.9
8/8/99	3:15	7.8	308	61	70	29.77	7.6
8/8/99	3:30	8.2	308	60	70	29.76	7.6
8/8/99	3:45	7.6	306	60	71	29.76	7.5
8/8/99	4:00	7.3	308	59	73	29.76	7.9
8/8/99	4:15	6.9	302	59	74	29.76	7.7
8/8/99	4:30	7.4	299	59	74	29.76	9.6
8/8/99	4:45	7.0	302	59	74	29.75	7.1
8/8/99	5:00	6.4	304	58	75	29.75	7.5
8/8/99	5:15	5.9	305	58	78	29.75	8.9
8/8/99	5:30	6.6	308	58	78	29.75	9.9
8/8/99	5:45	5.6	317	57	79	29.75	7.6
8/8/99	6:00	5.8	309	57	80	29.76	7.4
8/8/99	6:15	5.7	318	57	78	29.76	8.2
8/8/99	6:30	6.3	315	58	76	29.76	10.4
8/8/99	6:45	4.1	318	59	76	29.77	11.2
8/8/99	7:00	5.1	318	60	74	29.77	12.0
8/8/99	7:15	6.4	308	61	72	29.78	10.2
8/8/99	7:30	7.9	327	63	69	29.78	9.9
8/8/99	7:45	8.4	327	64	66	29.79	9.3
8/8/99	8:00	8.0	324	65	64	29.80	12.5
8/8/99	8:15	8.0	331	65	64	29.81	9.6

Amitraz Application Meteorological Data

Export Filename : C:\MICROMET\AMIT15\EXPORT\99071309.TXT

Export data for station : Amitraz15

8/8/99	8:30	5.8	329	65	65	29.81	10.3
8/8/99	8:45	7.8	321	65	63	29.82	10.8
8/8/99	9:00	7.9	320	66	62	29.82	10.2
8/8/99	9:15	7.7	316	65	64	29.83	9.6
8/8/99	9:30	7.0	318	65	64	29.83	13.4
8/8/99	9:45	7.7	312	66	63	29.83	13.7
8/8/99	10:00	8.1	324	68	61	29.83	12.7
8/8/99	10:15	6.6	331	68	61	29.83	17.3
8/8/99	10:30	7.0	339	70	58	29.84	14.0
8/8/99	10:45	7.9	337	71	55	29.84	14.7
8/8/99	11:00	8.2	339	72	54	29.85	13.7
8/8/99	11:15	7.5	337	72	52	29.85	26.0
8/8/99	11:30	6.9	337	73	51	29.86	15.5
8/8/99	11:45	7.7	331	74	51	29.85	18.7
8/8/99	12:00	6.7	329	75	50	29.86	25.4
8/8/99	12:15	6.4	342	76	48	29.86	15.2
8/8/99	12:30	7.6	335	76	47	29.85	16.3
8/8/99	12:45	7.1	340	77	44	29.85	17.5
8/8/99	13:00	7.4	333	78	43	29.85	18.9
8/8/99	13:15	7.4	328	78	42	29.85	16.5
8/8/99	13:30	7.0	326	79	42	29.85	21.3
8/8/99	13:45	6.8	332	79	42	29.85	21.9
8/8/99	14:00	6.6	320	80	41	29.85	23.3
8/8/99	14:15	8.1	342	80	40	29.84	23.1
8/8/99	14:30	6.9	328	81	39	29.84	20.4
8/8/99	14:45	6.6	294	81	37	29.84	33.1
8/8/99	15:00	6.4	319	82	37	29.83	23.3
8/8/99	15:15	4.7	314	83	36	29.83	35.7
8/8/99	15:30	5.4	336	83	35	29.83	16.3
8/8/99	15:45	6.0	307	83	36	29.82	25.9
8/8/99	16:00	6.3	329	83	35	29.82	27.8
8/8/99	16:15	6.1	347	84	35	29.81	40.9
8/8/99	16:30	6.1	324	83	35	29.80	20.1
8/8/99	16:45	8.1	317	82	36	29.80	10.9
8/8/99	17:00	7.3	315	82	37	29.80	11.2
8/8/99	17:15	8.4	322	81	38	29.80	13.1
8/8/99	17:30	6.8	332	81	38	29.80	15.7
8/8/99	17:45	7.8	330	82	37	29.79	10.8
8/8/99	18:00	8.1	325	81	38	29.79	10.3
8/8/99	18:15	8.5	337	81	39	29.79	11.6
8/8/99	18:30	7.3	332	81	40	29.79	9.2
8/8/99	18:45	7.0	330	81	39	29.78	9.5
8/8/99	19:00	7.2	325	80	41	29.78	9.5
8/8/99	19:15	7.1	323	79	42	29.78	7.8
8/8/99	19:30	6.4	324	78	42	29.78	7.0
8/8/99	19:45	6.8	323	77	45	29.77	6.1

Amitraz Application Meteorological Data

Export Filename : C:\MICROMET\AMIT15\EXPORT\99071309.TXT

Export data for station : Amitraz15

8/8/99	20:00	5.3	324	76	45	29.77	5.5
8/8/99	20:15	5.9	318	75	47	29.77	5.7
8/8/99	20:30	6.2	316	74	49	29.76	5.3
8/8/99	20:45	7.9	314	73	52	29.77	7.2
8/8/99	21:00	7.7	309	72	55	29.77	7.6
8/8/99	21:15	8.6	307	72	56	29.77	9.1
8/8/99	21:30	8.8	308	71	58	29.78	8.0
8/8/99	21:45	9.7	313	71	56	29.78	7.9
8/8/99	22:00	9.2	311	71	56	29.77	8.0
8/8/99	22:15	8.1	308	70	58	29.77	8.1
8/8/99	22:30	8.4	299	69	59	29.77	7.9
8/8/99	22:45	9.6	299	69	59	29.77	7.8
8/8/99	23:00	10.5	304	68	59	29.76	8.3
8/8/99	23:15	9.5	311	67	61	29.76	8.0
8/8/99	23:30	8.7	305	67	62	29.75	8.3
8/8/99	23:45	8.8	306	66	63	29.75	7.4
8/8/99	24:00:00	8.4	307	65	64	29.75	8.6
8/9/99	0:15	7.8	307	65	64	29.75	7.7
8/9/99	0:30	7.4	306	65	66	29.75	7.7
8/9/99	0:45	7.5	306	65	66	29.74	7.7
8/9/99	1:00	7.1	312	65	66	29.74	7.8
8/9/99	1:15	8.1	315	65	65	29.73	8.4
8/9/99	1:30	9.3	321	65	65	29.73	7.9
8/9/99	1:45	9.0	325	64	66	29.72	8.6
8/9/99	2:00	9.4	320	64	66	29.72	8.5
8/9/99	2:15	9.1	316	63	66	29.72	9.0
8/9/99	2:30	9.8	319	63	67	29.72	8.4
8/9/99	2:45	10.0	318	63	67	29.71	8.4
8/9/99	3:00	10.4	318	62	69	29.71	8.2
8/9/99	3:15	10.3	318	62	69	29.71	8.8
8/9/99	3:30	9.4	314	62	69	29.71	8.4
8/9/99	3:45	9.2	307	62	70	29.71	8.0
8/9/99	4:00	8.5	302	61	72	29.70	8.0
8/9/99	4:15	8.1	297	61	73	29.70	8.9
8/9/99	4:30	8.4	299	60	74	29.70	8.7
8/9/99	4:45	8.1	306	60	75	29.70	8.9
8/9/99	5:00	6.9	310	59	76	29.70	8.5
8/9/99	5:15	8.0	308	59	75	29.70	8.3
8/9/99	5:30	8.6	312	59	75	29.70	9.0
8/9/99	5:45	7.6	314	60	75	29.70	9.9
8/9/99	6:00	7.7	324	60	74	29.70	8.8
8/9/99	6:15	8.1	322	60	75	29.70	8.3
8/9/99	6:30	6.7	324	60	75	29.70	7.9
8/9/99	6:45	6.6	322	60	75	29.70	8.6
8/9/99	7:00	6.1	330	60	74	29.70	9.9
8/9/99	7:15	7.2	327	61	73	29.70	8.8

Amitraz Application Meteorological Data

Export Filename : C:\MICROMET\AMIT15\EXPORT\99071309.TXT

Export data for station : Amitraz15

8/9/99	7:30	5.8	317	61	73	29.70	10.2
8/9/99	7:45	7.5	324	62	70	29.71	9.8
8/9/99	8:00	8.3	321	62	69	29.71	8.4
8/9/99	8:15	8.8	321	63	67	29.71	9.8